



Annual Report

1978

WEST AFRICA RICE DEVELOPMENT ASSOCIATION

ASSOCIATION POUR LE DEVELOPPEMENT DE
LA RIZICULTURE EN AFRIQUE DE L'OUEST



WEST AFRICA RICE DEVELOPMENT ASSOCIATION (WARDA)

ANNUAL REPORT

January - December 1978

Monrovia, June 1979

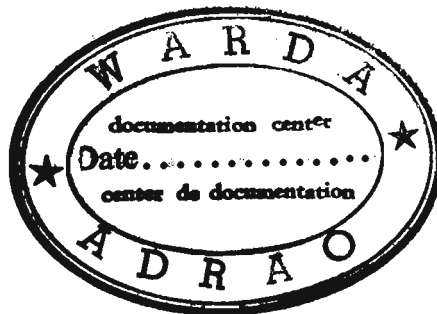


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FOREWORD

It is a pleasure to present the first Annual Report of the new Administration of the West Africa Rice Development Association (WARDA). This report covers the accounts of the Association from January 1978 to December 1978.

Significant changes and activities took place within the Association during this period. Among these are staff changes and improvement at the executive and professional levels, quinquennial reviews and evaluations of WARDA's activities, studies and consultancies, new programs, and acquisition of a new member and donors. All of these have expanded interests in WARDA and the importance of its programmes. It is also a demonstration of the quality of WARDA's work and the confidence it has elicited from within and without the subregion. We wish therefore to thank the WARDA Member States, the Bilateral and Multilateral Agencies and Cooperating Institutions for their support of WARDA.

Even though WARDA has made some impact on rice production programmes in its Member States, it is far from achieving its long-term objective of rice self-sufficiency within the subregion. As a result rice imports have increased in recent years, and this trend will continue even to 1985 if concerted efforts to reverse this trend are not made at the national and subregional levels.

Many important factors operate to slow the growth of rice production in the WARDA subregion. Population growth and increase in per capita rice consumption; unstable weather pattern; lack of adequate agricultural infrastructure, high yielding rice varieties and improved inputs and services constrain the acceleration of rice production efforts. WARDA and its Member States would therefore require large additional investment funds from internal and external sources to meet its food requirements by 1985.

Monrovia, Liberia
June 1979

Sidi Coulibaly
Executive Secretary

GOVERNING COUNCIL

Pays Membres/Member Countries

REPUBLIQUE POPULAIRE DU BENIN/PEOPLE'S REPUBLIC OF BENIN

M. Philippe AKPO - Chairman
Ministre du Développement Rural et de l'Action Coopérative
PORTO NOVO

COTE D'IVOIRE/IVORY COAST

M. Kouamé OTCHOUMOU
Directeur de l'Administration Centrale
Ministère de l'Agriculture
ABIDJAN

GAMBIE/THE GAMBIA

Hon. Jallow SANNEH
Parliamentary Secretary
Ministry of Agriculture and Natural Resources
BANJUL

GHANA

Brigadier N.A. ODARTEY-WELLINGTON
Commissioner of Agriculture
Ministry of Agriculture
P.O. Box M37
ACCRA

GUINEE BISSAU/GUINEA BISSAU

M. Luis C. RIBEIRO
Directeur de Service
Ministère de l'Agriculture
BISSAU

HAUTE VOLTA/UPPER VOLTA

M. Ibrahim B. NEBIE
Directeur National du CERICI
B.P. 540
BOBO DILOULASSO

LIBERIA

Hon. Florence A. CHENOWETH
Minister of Agriculture
Ministry of Agriculture
MONROVIA

MALI

M. Moriba CISSOKHO
Directeur de Cabinet
Ministère du Développement Rural
BAMAKO

NIGER

M. Zakary GARBA
Directeur Général de l'INRAN
B.P. 429
NIAMEY

NIGERIA

Mr. Muhammadu LIMAN
Federal Director of Agriculture
Federal Ministry of Agriculture
LAGOS

SENEGAL

Dr. Jacques DIOUF
Ministère du Développement Rural et de l'hydraulique
DAKAR

SIERRA LEONE

Hon. A.M. ULABA-SAMURA
Deputy Minister
Ministry of Agriculture and National Resources
FREETOWN

TOGO

M. Tonyawo AITHNARD
Directeur de la Recherche Agronomique p.i.
B.P. 431
LOME

SCIENTIFIC AND TECHNICAL COMMITTEE

Members/Membres

Dr. Christian E. Baker
Veterinary Consultant
P.O. Box 1180
Monrovia, LIBERIA

Dr. Zakary Garba
Directeur Général de l'Institut
National de Recherches Agronomiques
INRAN, B.P. 429
Niamey, NIGER

Dr. R.A.D. Jones
Acting Director
Rice Research Station
Rokupr, SIERRA LEONE

Dr. L.J. Marenah
FAO Expert
c/o UNDP
P.O. Box 24
Mogadishu, SOMALIA

M.L. Sauger
Directeur Général de l'Institut
Senegalais de Recherches Agricoles
B.P. 3120
Dakar, SÉNÉGAL

Dr. Bakary Toure
Doyen de la Faculté des Sciences de
l'Université d'Abidjan
B.P. 4322, Abidjan
COTE D'IVOIRE

Dr. Arouna Sema
Conseiller Technique
Ministère du Développement Rural
B.P. 1463
Lomé, TCGO

MANAGEMENT

WARDA's Constitution established three important institutions for the political (policy) technical and administrative management of WARDA. The WARDA Governing Council is the policy organ of the Association, and is composed of Ministers of Agriculture or Rural Development (or their representatives) from the fifteen member states. Members of the Governing Council are appointed by their respective Governments. The Council reviews and approves the programmes and budgets of the Association.

Scientific and Technical Committee (STC) is the technical organ of WARDA and is composed of twelve (12) scientists and professionals from member states (seven) cooperating institutions (three) and donor agencies (two). Members of the STC are elected by the Governing Council in their personal capacities based on their qualifications and experiences in agricultural science and general agronomy, sociology, education and training; and development and extension. The STC considers the scientific and technical programs and studies of the Association and submits its views and recommendations on them to the Governing Council through the Executive Secretary.

The Secretariat is composed of the Executive Secretary, Deputy Executive Secretary, Senior FAO Advisor, Planning and Audit Officer and their support staff.

Administrative and financial matters are handled by the Department of Administration and Finance, while the scientific and technical matters are handled by the Departments of Research, Development and Training and the Divisions of Communications and Documentation. Relationships with member states and cooperating institutions and donor agencies are established and maintained by the Executive and Deputy Executive Secretaries who also guide, supervise and coordinate the functions of the departments and divisions of WARDA.

It was on October 1, 1977 that the newly elected Executive Secretary, Mr. Sidi Coulibaly took over from Mr. Jacques Diouf who is currently the Secretary of State for Scientific and Technical Research in the Republic of Senegal. Dr. Nah-Doe Bropleh, Deputy Executive Secretary, who was elected at the Seventh Ordinary Session of the Governing Council in Cotonou, took over his new duties on January 9, 1978.

The first task of the new team was to visit member countries in order to maintain contact with local authorities so as to gain insight into the situation of rice development and research in the respective countries, their concerns, their evaluation of WARDA's programmes and activities as well as to benefit from suggestions that could be used in drawing up future plans and work programmes. Several visits have also been made to all the special research projects (Rokupr, Richard-Toll, Bouake and Mopti) as well as to several trial points. Old and potential new donors were contacted for continued and expanded support of WARDA's programmes.

The current Chairman of the Governing Council, His Excellency, Philippe Akpo, Minister of Rural Development and Cooperative Action of Benin undertook several missions within the framework of the mandate given him by the Governing Council. In May 1978, he visited Nigeria accompanied by the Executive Secretary. This was followed by a visit to the WARDA Headquarters where he was introduced to the services under the Executive Secretary and where he met with authorities of the Ministry of Agriculture of Liberia, the host country. He visited Monrovia again in September 1978 to preside over the final meeting between the Secretariat and the quinquennial review mission of the Technical Advisory Committee (TAC) and to express, on behalf of the Governing Council, the viewpoint of the member states on the preliminary remarks and recommendations of the review

mission. The term of office of this Chairman has been filled with activities and the Chairman has been very encouraging and supportative of the Executive Secretary and the entire WARDA staff. We would like to express our very sincere thanks to him.

The People's Revolutionary Republic of Guinea ratified the WARDA Act and Constitution and deposited them with the Ministry of Foreign Affairs of the Republic of Liberia. Thus Guinea became the 15th Member State of the Association.

We have successfully contacted potential new donors to whom we have already presented new projects for funding, for example we contacted the EEC in Brussels, the OPEC Special Fund in Vienna, the International Fund for Agricultural Development (IFAD) in Rome, and the U.N. Programme for Technical Cooperation between Developing Countries (TCDC).

Besides our normal activities with cooperating institutes and organizations, new cooperation agreements were signed with the International Institute for Tropical Agriculture (IITA) in Ibadan, Nigeria, the International Centre of Insect Physiology and Ecology (ICIPE), the Indian Council on Agricultural Research (ICAR) and the Pan-African Institute for Development, West Africa (Ouagadougou). Ties were established with regional cooperation organizations such as the African Development Bank (ADB), OMVS, CILSS, the Sahel Institute, Mano River Union, Lake Chad Basin Commission, CEAO and ECOWAS.

It is appropriate to record that though the UNDP is phasing out its regular support to WARDA by 1981, it has committed in 1978 funds to support for three years a WARDA administered Technical Cooperation among Developing Countries (TCDC) Project. WARDA is further encouraged by the promise of the Director-General of the Food and Agriculture Organization of the United Nations (FAO) to seek authority from the next FAO Conference for the

Technical Cooperation Program (TCP), in line with TCDC, to provide support to important regional organizations such as WARDA. This will make it possible for WARDA to receive assistance under FAO's regular programme.

This year has been particularly busy in terms of review and consultancy missions to help in the improvement of our financial, administrative and technical services. There were two consultancy missions on financial services, one on legal and constitutional matters and five quinquennial review missions on technical programmes in the areas of research, development, training, communications and documentation.

The USAID review mission evaluated WARDA training and special research projects at Mopti and Rokupr. A tripartite team consisting of UNDP/FAO and WARDA reviewed our development programs and TAC of the Consultative Group for International Agricultural Research (CGIAR) evaluated the entire WARDA activities with particular emphasis on the overall research programme. Small reviews were undertaken by IDRC on our special project, and by French Cooperation and Aid Fund (FAC) on the seed multiplication project. Both of these projects are located at Richard-Toll/Fanaye in Senegal. These technical reviews will form the basis for the WARDA Five-Year Plan covering 1980-1984.

The research, development, training and information activities have been quite satisfactory and continue to improve. A new Department of Training was created and a head appointed, who took office in November 1978. Given the volume and increasingly growing amount of management duties to perform, we strengthened our administrative and financial services by hiring a Chief of Administration and a Financial Comptroller. Management Committees were reconstituted with revised compositions.

ADMINISTRATION AND FINANCE

The Department provides administrative and financial support to the various programs and operations of WARDA. Administration is headed by an Administrative Officer and Finance by a Financial Controller, both of whose activities are directly supervised and coordinated by the Chief of Administration and Finance. Both the divisions of Administration and Finance were reorganized for better distribution and control of tasks and exercise of responsibilities. New terms of reference, job descriptions and work plans were prepared.

The Administration Division was organized into four units dealing with Personnel/Insurance, Procurement/Inventory, Liaison and Maintenance/Transport.

During the year, new conditions of service were established for staff at field projects to reflect local conditions and to avoid disparities between WARDA staff and national staff. Also new recruitment forms were devised together with appropriate scale of benefits and emoluments. These conditions were incorporated in the new Agreement signed between WARDA and the Government of Sierra Leone. The conditions of service for the Headquarters general services staff were reviewed and improved in order to be competitive and raise the morale of the staff. During the year there were eighteen (18) separations and twenty-one posts filled.

The procurement Officer was sent on an internship on international procurement procedures at the International Institute of Education (IIE) in New York and later was sent to the International Institute of Tropical Agriculture (IITA) in Ibadan on an attachment course to observe procurement procedures. A Clearing Agent was appointed to handle and accelerate all WARDA foreign orders and minimize rent charges.

Inventory and stores records and fixed assets have been updated and properly maintained at Headquarters.

Fixed Assets Ledgers were established for three field projects - Richard-Toll, Rokupr and Mopti and a similar exercise was commenced at Headquarters to bring the ledger up-to-date.

The Liaison Unit, as the Protocol arm of the Secretariat, has continued to arrange visas, entry and residential permits for the many visitors to WARDA's participants at Conferences and Seminars, students on training courses and staff members. It has, in particular tried to facilitate the enjoyment of privileges and immunities by staff members and provided a welfare service for the staff.

Maintenance services have been provided on an extensive scale both in the office and residential premises. Transport maintenance was also improved by the establishment of an internal workshop.

The Finance Division is organized into two sections of finance and budget. The Finance Unit has made some improvements in their accounting, control, codification and payment procedures. Plans have been made to improve these further by a greater degree of mechanisation and other measures. The Budget section operates under difficult conditions, as it has to prepare, monitor and report regularly on eighteen (18) different budgets separately. As many of these budgets have special rules and procedures for preparation and reporting, they create a certain degree of complexity and therefore slow down production. WARDA has recommended a unified budget and accounting approach.

The 1978 approved budget figures, statement of expenditures and Senior Staff list for the various programmes of the Association are presented in the following pages.

SUMMARY OF SOURCES AND APPLICATION OF FUNDS
BUDGET FOR 1978 (US \$ 000's)

SOURCES		APPLICATIONS	
IN CASH	\$ 1978	CURRENT EXPENDITURES	\$ 1978
MEMBER COUNTRIES			
- General Fund	844	Executive Secretariat	949
- WARDA Fund	258	Communications	115
- Reserve Fund	20	Documentation	87
		Development	554
TOTAL MEMBER COUNTRIES	1122	Research	1402
BELGIUM	66	Training	586
CGIAR	1714		
FRANCE	248	TOTAL CURRENT EXPENDITURE	3693
SWITZERLAND	80		
USAID	824		
		CAPITAL ACQUISITIONS	
TOTAL FUNDS IN CASH	4054	Executive Secretariat	62
IN KIND		Communications	5
FAO	265	Documentation	15
FRANCE	216	Development	35
UK	108	Research	713
		Training	120
TOTAL FUNDS IN KIND	589	TOTAL CAPITAL EXPENDITURE	950
TOTAL FUNDS AVAILABLE	<u>\$4643</u>	TOTAL FUNDS APPLIED	<u>\$4643</u>

WEST AFRICA RICE DEVELOPMENT ASSOCIATION
STATEMENT OF FUND EXPENDITURES FOR 1976

(\$ '000s)

DONORS	Personnel Costs \$	Cost of Common Services & Misc. Supplies \$	Travel & Meetings \$	Other Changes \$	Total Current Expenditure \$	Capital Expendit \$	Total Expenditure \$
MEMBER STATES							
- General Fund	712	126	110	26	974	59	1033
- WARDA Fund	-	21	3	3	27	54	81
- Reserve Fund	11	-	2	-	13	12	25
MEMBER STATES TOTAL	723	147	115	29	1014	125	1139
FAO	206	6	-	-	212	10	222
BELGIUM	15	4	24	10	53	7	60
CANADA - CIDA	-	-	-	4	4	162	166
- IDRC	166	66	3	-	235	24	259
CGIAR	761	156	288	355	1560	314	1874
FRANCE	118	40	44	4	206	1	207
KUWAIT	-	26	1	7	34	2	36
SAUDI ARABIA	10	14	3	18	45	142	187
SWITZERLAND	5	6	16	16	43	10	53
UNITED KINGDOM	48	-	-	14	62	53	115
USAID	464	100	61	29	654	399	1053
	\$ 2516	565	555	486	4122	1249	5371

All figures quoted in US\$ '000s.

PERSONNEL

EXECUTIVE SECRETARIAT

Mr. Sidi Coulibaly	Executive Secretary
Dr. Nah-Doe Bropleh	Deputy Executive Secretary
Mr. E. Quartey-Papafio	FAO Team Leader
Mr. B.D. Senegal	Head, Planning and Audit
Miss Begay Jagne	Bilingual Secretary
Mrs. Brenda Phillips	Administrative Secretary
Mrs. Catherine Woods	Administrative Secretary
Mr. Mamadou Maiga	Registry Secretary

ADMINISTRATIVE AND FINANCE DIVISION

Mr. G.O. Coleridge-Taylor	Chief, Administration & Finance
Mr. D. Sickelmore	Financial Controller
Mr. H. G. Ankoma-Sey	Finance Officer
Mr. J.N.A. Quaye	Administrative Officer
Mr. C.B. Dunbar	Personnel Officer
Mr. S.J. Merchant	Liaison Officer
Mr. T.S. Traore	Procurement Officer
Mrs. N.B. Neufville	Personnel Assistant
Mrs. Elsie Bruce-Doe	Bilingual Secretary
Mrs. Vera Duchein	Administrative Secretary
Mr. J. Edzii	Accounting Assistant
Mr. J. Dagher	Maintenance Officer
Mr. E. Henshaw	Budget Assistant
Mr. H. Larbi	Budget Assistant
Mrs. S. Fernandez	Secretary

RESEARCH DEPARTMENT

Dr. B.A.C. Enyi	Research Coordinator
Dr. D.K. Das Gupta	Variety Improvement Coordinator
Dr. G. Paku	Agronomic Statistician
Dr. M. Choudhury	Rice Breeder
Dr. A.O. Abifarin	Rice Breeder
Dr. D. Srivastava	Senior Plant Pathologist
Mr. B. Larinde	Seed Superintendent
Mrs. L. Kandakai	Assistant Seed Superintendent
Mr. G. Varango	Architect
Mr. O. Koffi	Sub-Regional Coordinator (Niger)
Mr. S. Assengnignou	Sub-Regional Coordinator (U.Volta)
Dr. R. Kargbo	Sub-Regional Coordinator (Gambia)
Mr. P. Chepuwura	Assistant Sub-Regional Coordinator (Ghana)
Miss M. Grant	Bilingual Secretary
Mrs. N. Magnani	Administrative Secretary
Mr. S. Cooper	Senior Field Technician
Mr. L. Hessou	Administrative Assistant

Special Research Projects

Rokupr, Sierra Leone

Mr. E. Jones	Soil Scientist and Head
Mr. J. Stenhouse	Breeder
Mr. M. Agyen-Sampong	Entomologist
Mr. M. Jones	Research Assistant, Breeding
Mr. H.M. Bernard	Research Assistant, Weed Science
Mr. C.A. Dixon	Research Assistant, Soil Science
Mr. S.N. Fomba	Research Assistant, Pathology
Mr. S.J. Fannah	Research Assistant, Entomology

Richard Toll - Fanaye, Senegal

Mr. H. Van Brandt	Acting Team Leader
Mr. A. Coly	Research Assistant, Variety Improvement
Mr. T. Diop	Research Assistant, Entomologist
Mr. I. Camara	Research Assistant, Soil Science
Mr. A.M. Diop	Research Assistant, Weed Science
Mr. J. Dome	Assistant Breeder

Mopti, Mali

Dr. S. Koli	Deputy Director
Mr. M. Goita	Research Assistant, Breeding
Mr. A. Diarra	Research Assistant, Weed Control
Mr. A. Toure	Research Assistant, Agronomy
Mr. C. Dembele	Research Assistant, Entomology
Mr. M. Dembele	Research/Extension Officer
Mr. K. Goita	Farm Manager
Mr. S. Diallo	Administrative Assistant

DEVELOPMENT DEPARTMENT

Dr. D.S.C. Spencer	Acting Head/Senior Economist
Mr. J.C. Levasseur	Economist
Mr. L. Peyrichou	Agronomist
Mr. D. Sanni	Rural Engineer
Mr. P. Sessou	Assistant Rural Engineer
Mr. G. Varango	Architect
Mr. K. Furugori	Rice Processing Expert
Mr. T. Akutsu	Assistant Rice Processing Expert
Mr. E. Arthur	Senior Draftsman
Miss A. Cox	Administrative Assistant
Mr. A. Ghartey	Stenographer

Seed Multiplication Center, Senegal

Mr. A. Diop	Director
Mr. P. Diouf	Assistant Director
Mr. P. De Schryver	Mechanization Specialist

TRAINING DEPARTMENT

Mr. D.K. Awute	Director, Training
Mr. K. Conteh	Head, Training Center
Mr. O. Mafolasire	Anglophone Trainer
Mr. T. Cole	Pathologist Trainer
Mr. A. Maiga	Francophone Trainer
Mr. J. Nketsiah	Interpreter/Translator
Mr. T. Seddoh	Interpreter/Translator
Mr. C. Morrison	Administrative Assistant
	Accountant

DOCUMENTATION DIVISION

Mr. B. Guindo	Acting Head/Senior Indexer
Miss I. Cafuir	Librarian
Miss S. de Lima	Librarian
Mr. E. Neblett	Photographer

COMMUNICATIONS DIVISION

Mr. G. Boccara	Translator and Head
Mrs. T. Martin	Translator
Mr. T. Asongwed	Translator
Mr. W. Godderis	French Teacher
Mrs. A. Fahnbulleh	Bilingual Secretary

RESEARCH PROGRAMME

The WARDA Research Programme has now entered its sixth year with emphasis on integrated approach. Activities have been concentrated on the strengthening of research management team, coordinated trials and special research projects, and national capacities.

ANNUAL RESEARCH REVIEW MEETING

The fifth research review meeting of WARDA was held in Monrovia in May 1978. Fifty three delegates from the Member States, Donor countries and Institutions participated.

At the meeting the WARDA research results and national reports were presented.

IN HOUSE REVIEW 1978

The Research Department held its first In-House Review at Richard-Toll between July 24-27, 1978. Twenty-three Research Scientists attended the review: five from Headquarters, four Sub-regional Coordinators and fourteen Research Scientist from Special Projects.

The important recommendations made during the review are detailed below:

1. It was agreed that reciprocal visits of the Assistant Research Coordinator to Special Projects and Project Leaders to Headquarters should be arranged at regular intervals.
2. It was agreed that evolution towards greater administrative autonomy should be encouraged in the administration of the Special Projects.
3. It was agreed that in view of the fact that Guinea has become a member of WARDA, an additional coordinator should be recruited to handle coordination in Liberia, Sierra Leone and Guinea. It was then suggested that in view of the heavy presence of WARDA in the former two countries and the fact that Guinea was likely to require greater attention early in its membership the new Sub-Regional Coordinator be based in the Republic of Guinea. The Scientific and Technical Committee has already approved this proposal.

4. The position of the Special Research Project at Bouake was discussed with a view of finding ways of strengthening the project (physically and financially).
5. On the question of the "Relationship of Research Department activity with other WARDA Activities", it was agreed that activities of the Research Department should extend to on-farm testing of superior varieties; operational trials aimed at identifying packages or practices and small-scale seed multiplication by the projects and sub-regional centres.
6. On the question of national research programmes, it was discovered that the Richard-Toll project was taking more of national rather than regional focus. The priorities set by WARDA were not being strictly followed. The matter of priorities in the Richard-Toll/Fanaye Project has been discussed at the Scientific and Technical Committee Meeting.
7. On the question of Technology Transfer, it was agreed that the sequence of events to be followed should basically be:
 - identification of problems;
 - provision of solutions and pre-extension testing of solutions of farmers' field by special projects;
 - small scale trials in all member countries with the relevant ecology; and
 - the actual transfer of the technology to the farm on a national scale to be done by the national extension services with participation of the Sub-regional Coordinators and/or the extension staff of the special projects.
8. It was also agreed that 1 Agronomist/Extension Officer be appointed for each special project, where they did not already exist.

9. On the question of integration of activities, the following suggestions on the manner of integration were advocated:

- integration at the discipline level;
- regular visits and backstopping by Headquarters staff to special projects and national programmes;
- annual in-house reviews where programmes are discussed and adopted;
- exchange of visits by the project leaders and scientists;
- visits of project staff and sub-regional staff to national projects;
- contributions through supervision of the coordinated trials; the breeders, especially, should endeavour to study the performance of the materials in that trials;
- screening of materials, herbicides and insecticides before advancing to the coordinated trials.

TRANSFER OF TECHNOLOGY IN RICE PRODUCTION IN WEST AFRICA
SUBREGION AND THE WARDA WORKSHOP IN NIGERIA

At the 1976 Research Review Meeting, it was recognized that the transfer of result and findings to farmers for their use should get increased emphasis in the WARDA research programme. Thus one of the special research projects, namely Rokupr is now conducting trials on farmers field in Sierra Leone and endeavouring to bring about the use of two wheeled tractors in Mangrove swamps cultivation apart from variety and fertilizer testing in farmers fields. Such efforts are to be extended to Guinea Bissau and The Gambia shortly. Preliminary work has been started by the Extension Assistants in the Mopti Project by involving deep water and floating rice farmers in better cultural practices and the use of improved varieties. The Sub-regional programmes now include on-farm testing of results obtained from the coordinated trials on a limited scale in member states as an incentive towards establishing large-scale minikit trials

that would accelerate their establishment in member states. Several rice varieties which have gone through the WARDA coordinated trials programme are now being grown at the seed multiplication stage in certain member states.

The WARDA workshop in Nigeria was held from September 23 to October 1, and attended by nine delegates from member countries, twelve WARDA staff from Headquarters and special projects, and one IITA Rokupr Outreach Staff. About 30 scientists from the Nigerian programme participated through out the seminar.

The Workshop was opened by the Military Administrator of Oyo State of Nigeria, Colonel Paul Tarfa.

At the technical sessions, four papers were presented. two from NCRI, one from WARDA and one from IITA, on the theme of technology transfer. The topics of the papers were:

- a) "The Race Towards Green Revolution for Rice in Nigeria: Is the Technology Available?"
by S.O. Fagade, National Cereals Research Institute, Moor Plantation, Ibadan.
- b) "The Nigerian Experience in Transfer of Rice Technology and its Impacts"
by A. Akinsola, National Cereals Research Institute, Moor Plantation, Ibadan.
- c) "The Role of WARDA in the Transfer of Technology"
by B.A.C. Enyi, West Africa Rice Development Association, Monrovia.
- d) "Rice Based Cropping Systems in West Africa"
by I.C. Mahapatra and D. Mahaparatra, UNDP/FAO/IITA Sierra Leone Rice Project Rice Research Station, Rokupr.

During the field tours, visits were made to the Plant Quarantine Centre, Institute of Agricultural Research and Training, IITA, the Shonga rice schemes, the Badeggi Rice Research Station, the Edogbigbe Rice scheme near Badeggi and finally the Kadawa Irrigation scheme near Kano.

COORDINATED TRIALS

During the dry season of 1976-77 and the main season of 1977, 115 coordinated trials were conducted in 38 locations in the member countries.

TRIAL RESULTS

Off-Season Variety Trials 1976-77

A. Short duration

The 1976-77 short duration Off-Season trial was conducted at 8 locations in eight countries. The trial was well conducted at each place and results were good. The performance of common varieties in the trial are summarized below:

No.	Variety	No of Locations	Range in Rank	Average Rank	Life Cycle in days	Average in t/ha	Per day yield in kg/ha
1.	IR630-27	3	1-3	2.33	127	5.99	47.2
2.	Thin Thio Way	5	4-13	8.40	122	5.26	43.1
3.	NTU 770-7-2	6	2-8	4.83	124	5.14	41.5
4.	Kwang She Sung	4	2-12	7.00	117	4.49	38.4
5.	4427	6	1-7	4.00	122	4.47	36.6
6.	Hong Sun	5	1-11	6.20	112	4.17	37.2
7.	IR30	7	1-13	7.14	118	4.11	34.8
8.	IR923-450-1	8	3-12	7.75	117	4.05	34.6
9.	Kn-1h-351-1-8-6	5	4-11	7.80	124	3.90	31.5
10.	IET 1996	7	3-10	7.00	123	3.83	31.1
11.	IR 747B ₂ -6-3	2	4-13	8.5	105	3.57	34.0
12.	IR28	5	3-11	6.8	118	3.47	29.4

IR 630-27 occupied the top position but Thin Thio Way and NTU 770-7-2 also showed very good performance. The yield of NTU 770-7-2 was found to increase sharply as the environment or management factors improved.

B. Medium Duration

The 1976-77 medium duration Off-season trial was conducted at six locations in six countries. Good results were obtained at each location and yields were satisfactory. Performance of the common varieties of the trial are shown below:

No.	Variety	No of Locations	Range in Rank	Average Rank	Life cycle in days	Average yield in t/ha	Per day yield in kg/ha
1.	IR1529-680-3	5	1-12	5.60	139	6.05	43.5
2.	IR790-28-6	6	3-6	3.83	140	5.76	41.4
3.	Vijaya	6	4-11	6.50	144	5.76	40.0
4.	IR2053-205-2	4	6-12	9.00	139	5.30	38.1
5.	IR1529-677	5	1-14	7.16	135	5.27	39.0
6.	IET 2885	3	2-9	5.00	135	5.00	37.0
7.	IR269-26-3-3-3	5	2-13	6.80	139	5.00	36.0
8.	IR937-55-3	5	2-11	7.60	140	4.93	35.2
9.	IR20	6	2-13	8.50	136	4.79	35.2
10.	4418	3	3-11	6.00	141	4.21	29.9
11.	2526	2	5-7	6.00	134	3.97	29.6
12.	IR1416-131-5	6	6-50	6.50	139	3.58	25.8
13.	4456	1	8	-	141	6.65	47.2*
14.	LAC 23	1	14	-	148	2.43	16.4*

* For Contubool only.

IR1529-680-3 showed its superiority in yield while IR790-28-6, once again, showed promise.

Upland/Rainfed Variety Trials - Main Season 1977

A. Short Duration

Fourteen varieties were nominated for the upland short duration trial of 1977. Some test locations used some standard check varieties. The trial included semi-dwarf, semi-tall and tall varieties. The new entries in 1977 were:

B 459b-Pn-4-5-6-5
 IR 30
 IR 2053-205-2
 BR 51-53-5
 4367
 B 459b-Pn-4-5-7-5
 IR 1480-116-3-3

The upland short duration trial of 1977 was conducted at ten sites in ten countries. In Senegal, Gambia, Guinea Bissau, Mali and Upper Volta, either drought directly affected the trial or low relative humidity with high temperature caused severe grain sterility. There was no natural calamity in other countries. The performance of nominated varieties and some standard check varieties are summarized below:

No.	Variety	No of locations	Range in Rank	Average rank	Life cycle in days	Grain yield in t/ha	Per day yield in kg/ha
1.	Dourado Precoco	2	1-1	1.00	112	4.48	40.4
2.	BR 51-53-5	2	1-5	3.00	117	3.80	32.5
3.	I Kong Pao (Check)	2	2-2	2.00	108	3.72	34.4
4.	Tongil 917	2	3-11	7.00	118	3.39	28.7
5.	IRAT 10	7	1-3	1.60	106	3.20	30.2
6.	IR 30	3	3-10	6.00	112	2.92	26.1
7.	4367	3	6-8	7.00	123	2.77	22.5

No.	Variety	No of locations	Range in Rank	Average rank	Life cycle in days	Grain yield in t/ha	Per day yield in kg/ha
8.	SE 314g	7	1-9	3.00	106	2.68	25.3
9.	B459b-Pb-4-5-6-5	2	5-13	9.00	113	2.68	23.7
10.	BR 44-11-1	4	4-11	6.00	120	2.41	20.1
11.	BR 34-11-2	6	2-8	3.83	117	2.29	19.6
12.	B459b-Pn-4-5-7-5	2	8-14	11.00	121	2.26	18.7
13.	IR2053-205-2	4	3-7	4.50	125	2.17	17.4
14.	IR1480-116-3-3	6	3-12	6.50	114	1.89	16.6
15.	IR1704-13-3-2	3	10-15	12.33	119	1.62	13.6
16.	IR747B ₂ -6-3	1	9	-	113	2.02	17.9

*Yields less than 1 t/ha were not considered.

Under drought conditions, Dourado Precoce and IRAT 10 were found to be the better varieties. I Kong Pao and SE 314 G also proved themselves to be outstanding among the varieties. Among the newly nominated varieties BR 51-53-5 came out as a very promising variety.

B. Medium Duration:

Thirteen varieties were nominated for the upland medium duration trial of 1977 and most locations used local check varieties. The trial included semi-dwarf, semi-tall and tall varieties. Ten new entries in 1977 were:

IR2035-108-2

IR2035-104-2

IR937-55-3

4455

IET2885

BR51-331-4

4418

IR2035-250-3

The upland medium duration variety trials was conducted at nine locations in eight countries. At one location the trial was divided into two experiments. One country had two locations. In general the results were good this year. The performance of the nominated entries are summarized in the following table:

No.	Variety	No of locations	Range in rank	Average rank	Life cycle in days	Grain yield in t/ha	Per day yield in kg/ha
1.	IRAT 9	8	1-14	5.50	112	2.60	23.2
2.	4418	8	1-5	2.62	124	2.59	20.0
3.	IRAT 13	9	2-10	5.44	112	2.49	22.2
4.	IR2035-108-2	8	1-9	4.12	126	2.48	19.7
5.	IET 2885	7	2-6	4.57	132	2.40	18.2
6.	IR1529-680-3	8	2-13	5.50	130	2.30	17.7
7.	IR2035-104-2	4	6-13	9.25	131	2.29	17.5
8.	IR2035-250-3	5	4-12	7.60	135	2.23	16.5
9.	IR2035-250-3	5	4-12	7.60	135	2.23	16.5
10.	IR937-55-3	7	3-13	7.85	131	2.08	16.0
11.	4455	7	3-14	8.71	130	1.77	13.6
12.	BR51-331-4	6	2-14	10.83	132	1.61	12.2
13.	TOS 2581	2	8-12	10.00	140	1.40	10.0

*Yields less than 1 t/ha were not considered.

This year's results clearly show that under drought conditions IRAT 9 and IRAT 13 are best suited and give reasonably good yields while under wet conditions 4418, IR2035-108-2 and IET 2885 are better suited and produce higher yields. Thus rainfall is a major determinant in the suitability of a variety.

Irrigated Variety Trials - Main Season 1977

A. Short Duration

Fourteen varieties were nominated for the irrigated short duration trial of 1977. Out of these, eight were new varieties. All the locations tested most of the varieties and most of the sites included standard check varieties. The new entries in 1977 were:

BR51-118-2
 4448
 BR51-319-9
 IR2053-375-1-1-5
 Batogia
 IR2-53-241-3-2-3
 IR2035-250-3
 BR34-13-5

The irrigated short duration trial of the Main Season of 1977 was conducted at eighteen locations in all the member countries. Results were good in general and most of the locations showed high yields. Several new entries came into prominence. The performance of the nominated varieties are summarized in the following table:

No.	Variety	No. of locations	Range in rank	Average rank	Life cycle in days	Grain yield in t/ha	Per day yield in kg/ha
1.	BR51-118-2	14	1-13	2.6	133	5.78	43.5
2.	4448	14	1-10	3.6	133	5.57	41.9
3.	BR51-319-9	12	1-10	4.8	131	5.15	39.3
4.	IR2053-375-1-1-5	11	1-12	6.5	128	4.84	37.8
5.	IR630-27	14	2-11	6.9	129	4.84	37.5
6.	IET 1996	11	1-11	6.5	131	4.74	36.2
7.	Bahagia	13	3-14	8.3	142	4.67	32.9
8.	NTU 770-7-2	7	4-14	9.4	122	4.49	36.8

No.	Variety	No. of locations	Range in rank	Average rank	Life cycle in days	Grain yield in t/ha	Per day yield in kg/ha
9.	IR934-450-1	14	2-13	8.6	117	4.37	37.4
10.	IR2053-241-3-2-5	14	2-14	9.6	135	4.32	32.0
11.	IR2035-250-3	9	4-14	8.6	138	4.28	31.0
12.	BR34-13-5	12	7-13	9.6	117	4.25	26.3
13.	Kwang She Sung	13	1-14	9.9	113	4.13	36.5
14.	IR28	13	10-15	12.2	118	3.83	32.5

Many new entries showed excellent performance and demonstrated superiority over older varieties. BR51-118-2 and 4448 showed very outstanding performance. BR51-118-2 particularly produced top yields under many different conditions. Its super yielding ability, taller plant type and disease resistance are likely to make it very popular. 4448 appears to be a tough variety for all kinds of conditions as well. It should find its place in farmers' fields in the very near future. The other most promising variety, BR51-319-9 deserves further observation.

B. Medium Duration

Fifteen varieties were nominated for irrigated medium duration trial, out of which seven varieties were repeated from the previous year. The new entries are listed below:

BR51-49-6	Mahsuri
BW 196	IR2068-65-3
BR 52-8-1	IR 32
Improved Mahsuri	Huallaga

The irrigated medium duration trial of 1977 was conducted at 19 locations in all the member countries. The results in general were good and yields were high at most of the locations. The performance of the common varieties is summarized in the following table:

No.	Variety	No of loca- tions	Range in rank	Aver age rank	Life cycle in days	Grain yield in t/ha	Per day yield in kg/ha
1.	IR790-28-6	9	1-14	6.2	137	5.58	40.7
2.	IR1416-131-5	17	2-14	5.2	135	5.24	38.8
3.	IET 2885	6	1-13	6.0	141	5.15	36.5
4.	BR51-49-6	17	1-13	7.1	139	5.12	36.8
5.	BW 196	17	1-11	6.0	139	4.92	35.4
6.	IR1529-680-3	19	1-15	8.1	128	4.79	37.4
7.	BR52-8-1	17	3-12	6.9	133	4.77	35.9
8.	IR32	18	2-15	7.3	145	4.76	33.3
9.	Improved Mahsuri	18	1-14	6.9	137	4.71	34.4
10.	IR1529-677	18	1-15	9.1	131	4.70	35.9
11.	IR2068-65-3	16	1-15	9.9	134	4.59	34.3
12.	IR 20	19	3-16	8.6	133	4.58	34.4
13.	Mahsuri	18	1-15	8.6	139	4.49	32.3
14.	4456	17	1-15	9.6	127	4.35	34.3
15.	Huallaga	17	5-15	10.5	131	4.33	33.1

IR790-28-6 came out as the best yielding variety. This conforms its excellent performance last year. IR1416-131-5 which occupied sixth position last year became the second best yielder this year. IET 2885 also maintained its superiority. Two new varieties, BR51-49-6 and BW 196 out-yielded the standard variety IR1529-680-3. The superior performance of IR790-28-6 and IET 2885 for two years clearly points out their potential of becoming commercial varieties in the region.

Mangrove Swamp Variety Trials - Main Season 1977

A. Medium duration

Fourteen medium duration varieties, mentioned below, were nominated for mangrove swamp and deep flooded conditions. Trial results for mangrove swamp and deep flooded conditions are, however, presented separately in accordance with a decision taken at the last Research Review Meeting. Some are adaptable to problem soils, while some have elongation ability under flooded conditions.

AXBG 7.3	Improved Mahsuri
C.J.5.2	IR2071-621-2
ROK 5	IR2035-120-3
Gambiaka Kokum	IR2851-41-3
D52-37	B453-b-49-4-2-3
Mange	BNN 6323
	IR2071-105-7

The mangrove swamp medium duration variety trial was conducted at Rokupr, Sierra Leone and Caboxanque, Guinea Bissau.

Rice seedlings were transplanted at Rokupr in July and at Caboxanque in September. The varieties at Rokupr took longer to mature than those at Caboxanque. However, the grain yields of all the nominated varieties at the latter site were higher than at the former site. It seemed that the growing conditions at Caboxanque were better than those at Rokupr

Performance of the varieties is presented in the table below:

No.	Variety	No. of sites	Average life cycle days	Average yield (t/ha)	Range in rank	Average rank
1.	ROK 5	2	135	4.83	1-2	1.5
2.	C.13.F1	2	135	4.80	1-2	1.5
3.	D52-37	2	137	4.50	3	3.0
4.	AXBG 7.3	2	134	4.15	5-7	6.0
5.	Range 2	2	135	4.05	5-10	7.5
6.	IR2851-41-3	2	138	3.93	8-9	8.5
7.	IR2035-120-3	2	137	3.73	4-12	8.0
8.	B453b-49-4-2-3	2	139	3.64	9-12	10.5
9.	Improved Mahsuri	2	142	3.60	6-13	9.5
10.	C.J.5.2	1	128	3.34	15	-
11.	IR2071-105-2	2	139	3.18	11-13	12.0
12.	IR2071-105-7	2	139	3.09	11-14	12.0
13.	BKN 6323	2	140	2.97	11-14	12.5
14.	Gambiaka Kokum	1	148	2.94	7	-

Except C.J.5.2. and Gambiaka Kokum all the other varieties were tested at the two locations.

ROK 5 gave the highest yield (4.83 t/ha) and showed very good average rank (1.5). C.13.F1. also showed similar yield potential (4.80 t/ha) and average rank (1.5). The two varieties took 135 days to mature. D52-37 and AXBG.7.3 were the third and fourth to yielding varieties respectively.

In 1976 also the above four varieties exhibited high yield ability. In the 1975 trial, ROK 5 gave the second best yield (3.53t/ha) From the results of the last three years, it seems ROK 5 has high yield potential.

B. Long Duration

Fourteen varieties, listed below were nominated for both mangrove swamp and deep flooded conditions. Some of the varieties are known to have salt tolerance, some are adaptable to problem soils and others have elongating abilities.

- | | |
|--------------------|----------------------|
| 1. FARO 14 | 8. GISSI 25 |
| 2. AA8A | 9. Nachin 11 |
| 3. GC 23 | 10. Improved Mahsuri |
| 4. BL4-E | 11. Mahsuri |
| 5. RH ₂ | 12. Brrisail |
| 6. DM16 | 13. Pajam II |
| 7. Phar Com En | 14. Pulot Malaysia |

The mangrove swamp long duration variety trial was conducted only at Rokupr, Sierra Leone.

Mahsuri, the new introduced variety gave the highest grain yield (3.41 t/ha). The other promising varieties are BL4-E (3.33 t/ha), DM16 (3.31 t/ha) and Nachin 11 (3.27 t/ha).

Deep Flooded Variety Trials -- Main Season 1977

A. Medium Duration

Both mangrove swamp and deep-flooded medium duration variety trials had the same nominated varieties, listed earlier.

The deep-flooded medium duration variety trial was conducted at Sapu in the Gambia and Kopti in Mali. At Sapu, the trial was never under deep flooded conditions but more like under irrigated conditions. Also at Kopti, the varieties suffered from water stress. However, at the two locations, the new introduced variety, Improved Mahsuri, showed promising yields.

B. Long Duration

Both mangrove swamp and deep flooded long duration variety trials had the same nominated varieties.

The deep flooded long duration variety trials was conducted at Sapu (The Gambia), Mopti (Mali) and Gbomsamba (Sierra Leone).

At Sapu the trial was never under deep flooded conditions but was more like irrigated; at Mopti, the varieties suffered from water stress, drought and leaf roller insect attack, while at Gbomsamba delayed harvesting caused profused shattering of grains of most varieties. However, the new introduced varieties like Brisail (7.7 t/ha) and Pulot Malyasia (6.76 t/ha) at Sapu (The Gambia) and Mahsuri (1.9 t/ha) at Mopti (Mali) showed some promise.

Variety Trials under deep water (Floating) Conditions

The trial was conducted at Mopti (Mali). Most of the varieties were already proven as promising floating rice varieties in the region. The varieties nominated were:

- | | |
|------------------|-----------------------------|
| 1. Cula | 9. Indochine Blanc |
| 2. Khao Gaew | 10. Indochine 70 |
| 3. Mali Sawn | 11. Puang N'Gorn 16-60-51-C |
| 4. Maliong | 12. IM16 |
| 5. Malobadian | 13. C74 |
| 6. Nang Kiew | 14. BH ₂ |
| 7. Neang Kheaw 5 | 15. DM16 |
| 8. FRRS 43/3 | 16. MSP 11 |

The mangrove swamp long duration variety trial was conducted only at Rokupr, Sierra Leone.

Mahsuri, the new introduced variety, gave the highest grain yield (3.41 t/ha). The other promising varieties are BL4-E (3.33 t/ha) DM16 (3.31 t/ha) and Nachin 11 (3.27 t/ha).

Deep Flooded Variety Trials - Main Season 1977

A. Medium Duration

Both mangrove swamp and deep-flooded medium duration variety trials had the same nominated varieties, listed earlier.

The deep-flooded medium duration variety trial was conducted at Sapu in the Gambia and Mopti in Mali. At Sapu, the trial was never under deep-flooded conditions but more like under irrigated conditions. Also at Mopti, the varieties suffered from water stress. However, at the two locations, the new introduced variety, Improved Mahsuri, showed promising yields.

B. Long Duration

Both mangrove swamp and deep flooded long duration variety trials had the same nominated varieties.

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- | | |
|------------------|-----------------------------|
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| 2. Khao Gaew | 10. Indochine 70 |
| 3. Mali Sawn | 11. Puang N'Gern 17-60-51-C |
| 4. Maliong | 12. IM16 |
| 5. Malobadian | 13. C74 |
| 6. Nang Kiew | 14. BH ₂ |
| 7. Noang Kheaw 5 | 15. DM16 |
| 8. FRRS 43/3 | 16. MSP 11 |

Varieties 1 to 11 were also nominated for the 1975 and 1976 trials. In the 1975 and 1976 seasons, the trials were conducted at the old experimental site at Ibetemi, while in the 1977 season they were conducted at the new site at Mopti.

The variety trial on floating rice was conducted at three water depths at Mopti, (Mali). The varieties suffered from water stress and late arrival of flood water. Precision of the trials was low (CV ranged from 31.2 to 32.1%); hence results are not conclusive.

The yield performance of the top five varieties at the three depths are presented in the following table:

Upper Zone (Water depth 0.80m)		Medium Zone (Water depth 0.80m 1.30m)		Deeper Zone (Water depth 1.30m)	
Variety	Yield (t/ha)	Variety	Yield (t/ha)	Variety	Yield (t/ha)
1. IM16	2.73	1. IM16	2.49	1. Indochine	2.22
2. BH ₂	2.58	2. DM16	2.38	2. Malobadian ⁷⁰	2.19
3. C74	2.54	3. Indochine Blanc	2.32	3. Mali Sawn	2.08
4. Cula	1.70	4. Indochine 70	2.23	4. DM16	2.03
5. Khao Gacw	1.66	5. Puang N'Gern 17-60-51-C	2.23	5. FRRS 43/3	1.95

In general, yields at the upper zone were higher than those at medium and deeper zones.

IM16 gave the highest yield at both upper and medium zones, while DM16 and Indochine 70 maintained about the same yield at both medium and deeper zones.

In general, varietal performance was better in 1976 than in 1977.

INITIAL EVALUATION TEST (IET)

The Initial Evaluation Test (IET) has been organized and conducted as part of the WARDA Coordinated Trials. The purpose of this test is to provide elite breeding lines and varieties of diverse genetic make up to the scientists of the member countries and to evaluate their performance under varied ecological conditions. IET provides a continuous flow of materials of recent origin. This gives chance to the scientists to select materials adapted to their conditions for national breeding programmes. Promising materials from IET are advanced to the WARDA coordinated variety trials.

Composition of the test

The test was composed of 400 entries originating from IRRI and various national and international rice improvement programmes. Some entries were taken from IRONN76. The original sources of the material are shown below:

<u>Source</u>	<u>Number of entries</u>
Bangladesh	54
CIAT	24
IITA	8
India	30
Indonesia	20
IRAT	11
IRRI	139
Moor Plantation (Nigeria)	7
Rokupr (Sierra Leone)	20
Senegal	10
Sri Lanka	9
Suakoko (Liberia)	5
Thailand	29
Others	34
Total	<u>400</u>

The test materials were sent to sixteen locations.

Management

Entries were suggested to be planted in 2 to 3 rows of 5 meters each or 5 to 6 rows of 3 meters each. Standard fertilizer rates and spacing were recommended. Application of insecticides was to be minimized.

Data Collection

Information was requested on final plant height, 50% flowering duration, number of panicles per hill, number of hills harvested, grain yield, blast reaction, leaf-scald reaction, brown leaf spot reaction, dead and white heads and other insects and soil problems.

Results

The IET was conducted under upland conditions at IITA*, Nyankpala, Bouake, Farakoba and Sapu.

Under irrigated condition, the test was conducted at Badeggi, Gagnoa, Suakoko, Suakoko (SNF), Libore, Kogoni, Sapu and Richard Toll. The summary results are presented below:

<u>Number of location</u>	<u>Number of Entries</u>	<u>Entries selected</u>
12	400 (250 from IROM-76 and rest from WARDA Hq)	<u>Upland:</u> 4450, FAR08, Mahsuri, IR2035-108-2, Juma 1, IR2053-442-1-2-3, IET 3226, B49, Tchong Fung, SE319G, Tally, Pursur. <u>Irrigated:</u> IET 2911, IET 1785, IET 3226, H-5, BR52-51, B453-49-4-3, IR2061-22-8-3-9, IR2071-P339-2, IR2042-178-1, IR2798-143, IR2053-205-1-6-3, IR2071-621-2-2, IR2061-151-4, IR1544-57-1-1, IR2798-108-3, IR1544-38-2-2

* Not strictly upland but a mixture of dryland, hydromorphic and swamp.

Several other strains e.g. BR51-118-2, ROK7, BR51-319-9. 4448, BKN 6323, ADNY 3, IET 1996, BW 196, which were identified as very promising are already being tested in the coordinated variety trials.

The selections were made on the basis of average performance while each participating station was able to select promising lines based on their performance under that ecology.

Strengthening the Initial Evaluation Tests

The screening of a wide range of germplasm under the various agro-climatic conditions of the region has progressed considerably. The following significant steps have been taken in this regard.

- i) The establishment of 5 ha nursery farm at Suakoko Liberia with full irrigation facilities and a laboratory. About 3,000 lines are grown annually for preliminary observation and seed multiplication
- ii) Improving the seed service facilities at the seed storage centre.
- iii) Identifying 14 national stations with all the representative agro-ecological conditions for variety screening, improving the research facilities at such stations and training national scientists who should participate in the screening.
- iv) Appointing a breeder to be in charge of the variety introduction and field screening: recently a Pathologist was appointed to participate in the screening and quarantine aspects among other responsibilities. Another Breeder from IITA was added to the WARDA program to provide liaison between IITA and WARDA.
- v) The construction of medium term seed storage facilities.

VARIETY ADAPTABILITY STUDIES

Yield performance of varieties at various locations have been reported in earlier chapters. Ecological conditions varied from location to location and these affected the yields of varieties. The object of this study is to examine the ways that different varieties interact with the different environments and to identify varieties with wide adaptability under varying environmental conditions.

For each type of trial considered, the regression of the variety means on an environmental index provided estimates of the desired adaptability parameters. The model used was:

$$Y_{ij} = m_i + b_j I_j + e_{ij}$$

where Y_{ij} is the mean of the i^{th} variety at the j^{th} environment, m_i is a constant for the i^{th} variety, b_j is the regression coefficient that measures the response of the i^{th} variety to varying environment I_j is the j^{th} environmental index and e_{ij} is the deviation from regression of the i^{th} variety at the j^{th} environment.

The quantities used as environmental indices were the means of all varieties considered at the various common locations. An index independent of the varieties and obtained from environmental factors such as rainfall, temperature, and soil fertility would have been more desirable; however, the relationship between the factors and yield is lacking.

The phrase "stable variety" has often often been applied to a variety that yields the same over a wide range of environments; that is a variety with regression coefficient near to zone. This means that a stable variety performs relatively well under adverse conditions but not so well less than average.

What is desired in this study, however, is a variety that does above average in all environments; that is a variety with a high mean yield over all environments regression coefficient close to or equal to one; or in lay terms, a variety with superiority no matter what the environmental conditions.

SUMMARY OF RESULTS

1. Irrigated Short: Off Season 1976-77 (Fig.3)

Seven varieties from the irrigated short duration trial (off season 1976/77) were examined, IET 1996, IR934-450-1 and NTU 770-7-2 had regression coefficients greater than 1.0 (1.057, 1.328 and 1.240) respectively, and average yields 3.83, 4.05 and 5.14 t/ha respectively, 4427, IR28 IR30 and Kn-lh-351-1-8-6 had regression coefficients 0.925, 0.674, 0.869 and 0.828 respectively and average yields 4.47, 3.47, 4.11 and 3.90 respectively.

4427 is the most adaptable among the seven varieties followed by IR30. Although NTU 770-7-2 gave a high average yield and is expected to out yield both 4427 and IR30 under very favourable environmental conditions, it is relatively poor at unfavourable conditions.

In the 1976 main season, IET 1996 was shown to be well adapted. In this trial, however, the average yield was much lower than in the previous year although the regression coefficient remained very close to 1.0.

2. Irrigated Medium: Off Season 1976/77 (Fig 4)

Eight varieties were examined from this trial. IR790-28-6, IR1529-680-3, Vijaya, IR1529-677, IR1416-131-5, IR269-26-3-3-3 and IR937-55-3 had regression coefficients 1.171, 1.362, 1.205, 1.076, 1.042, 1.271, 1.045 and average yields 5.76, 6.05, 6.08, 4.86, 4.68 5.00 and 4.93 t/ha respectively. Only IR20 had regression coefficient less than 1.0. It gave average yield of 4.79 and regression coefficient 0.848.

IR790-28-6 is the best adapted. However IR20 would outyield it under extremely less favourable conditions, while IR1529-680-3 would outyield it under extremely more favourable conditions.

3. Rainfed Short: Main Season 1977 (Fig.1)

Ten varieties from the 1977 rainfed short duration variety trials were examined. IR1704-13-3-2, IR30, IR2053-205-2, B459B-PN-4-5-7-4, IR1480-116-3-3 and IRAT 10 had regression coefficients less than 1.0 (0.627, 0.922, 0.913, 0.761, 0.534 and 0.767 respectively) and average yields 1.14, 1.51, 1.63, 1.24, 1.89 and 2.29 respectively. SE 314G, BR34-11-2, BR44-11-1 and 4367 had regression coefficients 1.377, 1.041, 1.033 and 1.129 had regression coefficients 1.377, 1.041, 1.033 and 1.129 and average yields 2.04, 2.00, 1.68 and 1.60 t/ha respectively.

IRAT 10 appears by far the most adaptable followed by BR34-11-2. Although SE 314G had good average yield, it also had a high regression coefficient. Thus SE314G is a good yielder under favourable environmental conditions but quite poor under unfavourable conditions.

4. Rainfed Medium: Main Season 1977 (Fig.2)

The study involved 12 varieties. All the varieties had regression coefficients slightly greater than 1.0 except IRAT 13, 4455 and BR51-331-4. Varieties 4455 and BR51-331-4 also had rather low average yields. IRAT 13, although it had high average yield, had a low regression coefficient (0.787). That is, it is expected to be outstanding under unfavourable environmental conditions but yield relatively poorly under favourable conditions. However, the range of unfavourable conditions at which IRAT 13 is superior is narrow.

IR1529-680-3, IR1529-677, IRAT 9, IR2035-108-2, IR937-55-3, IR2035-104-2, IET 2885, 4418 and IR2035-250-3 had regression coefficients 1.306, 1.370, 1.127, 1.209, 1.339, 1.222, 1.271, 1.271, and 1.198 respectively and average yields 2.23, 2.07, 2.30, 2.46, 1.91, 1.69, 2.14, 1.43, 2.41 and 1.72 t/ha respectively.

IR2035-108-2, 4418, IRAT 9, IR1529-680-3 and IET 2885 seem to be more adaptable than the others.

5. Irrigated Short: Main Season 1977 (Fig 5)

All the 14 common varieties nominated for the irrigated short duration trial of 1977 main season were investigated (c.f. Chapter 5). Except for IR28, KSS, BR34-13-5 and IR2053-241-3-2-3 which gave low average yields and except for IR2035-250-3 and NTU 770-7-2 which had regression coefficient 0.619 and 0.506 respectively, all other varieties showed fair adaptability or good adaptability.

BR51-118-2 and 4448 showed the greatest adaptability with BR51-118-2 doing better under highly favourable environmental conditions while the reverse is true under extremely unfavourable conditions. Whatever the conditions, however, these two varieties do better than average. IR630-27 and IET 1996 are also fairly adaptable but have lower average yields than BR51-118-2 and 4448. They also always did better than average no matter what the conditions. IET 1996 also showed good adaptability in the previous main season trial.

6. Irrigated medium: Main Season 1977 (Fig 6)

All the 15 common nominated varieties of the trial were included in the study (c.f. Chapter 6). Except for IR2068-65-8 and Huallaga which were low average yielders and except for Improved Mahsuri and Mahsuri which had regression coefficients 0.756 and 0.811 respectively, all the other varieties seem to have good adaptability. However, IET 2885, IR1416-131-5 and IR790-28-6 seem to be more adaptable than the others. It may be recalled that these same varieties showed good adaptability during the previous main season. IR790-28-6 also showed good adaptability during the 1976-77 Off Season.

FIG. 1

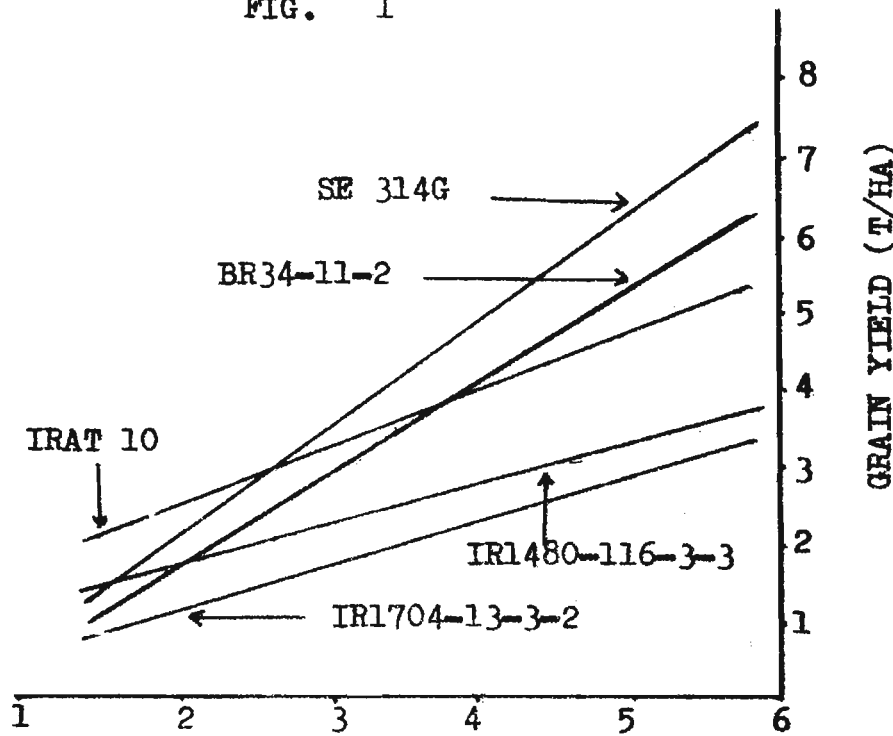
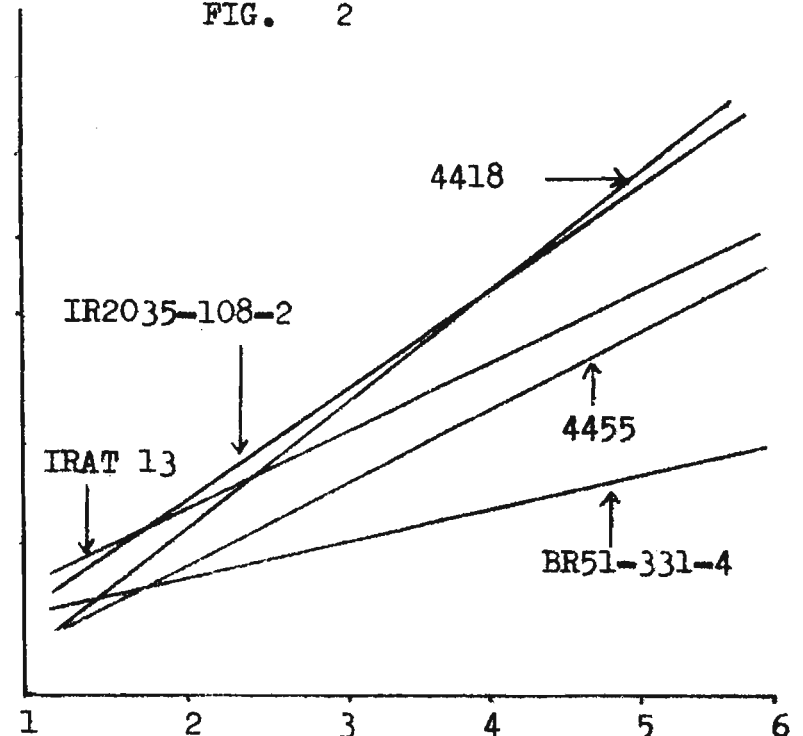


FIG. 2



ENVIRONMENTAL INDEX (T/HA)

VARIETY ADAPTABILITY STUDIES

- 1 RAINFED SHORT DURATION MAIN SEASON 1977
- 2 RAINFED MEDIUM DURATION MAIN SEASON 1977
- 3 IRRIGATED SHORT DURATION OFF-SEASON 1976/77
- 4 IRRIGATED MEDIUM DURATION OFF-SEASON 1976/77
- 5 IRRIGATED SHORT DURATION MAIN SEASON 1977
- 6 IRRIGATED MEDIUM DURATION MAIN SEASON 1977

FIG. 3

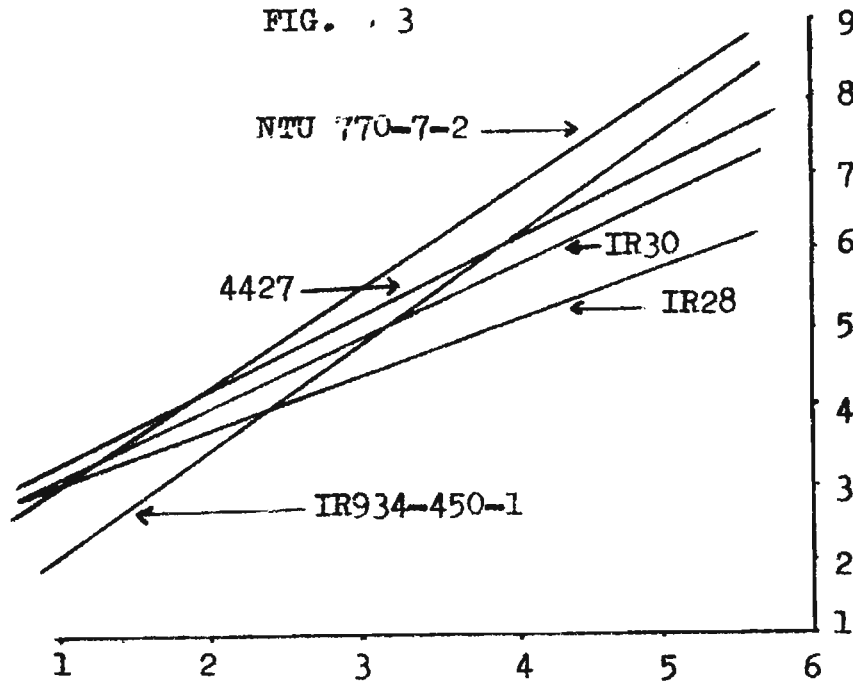


FIG. 4

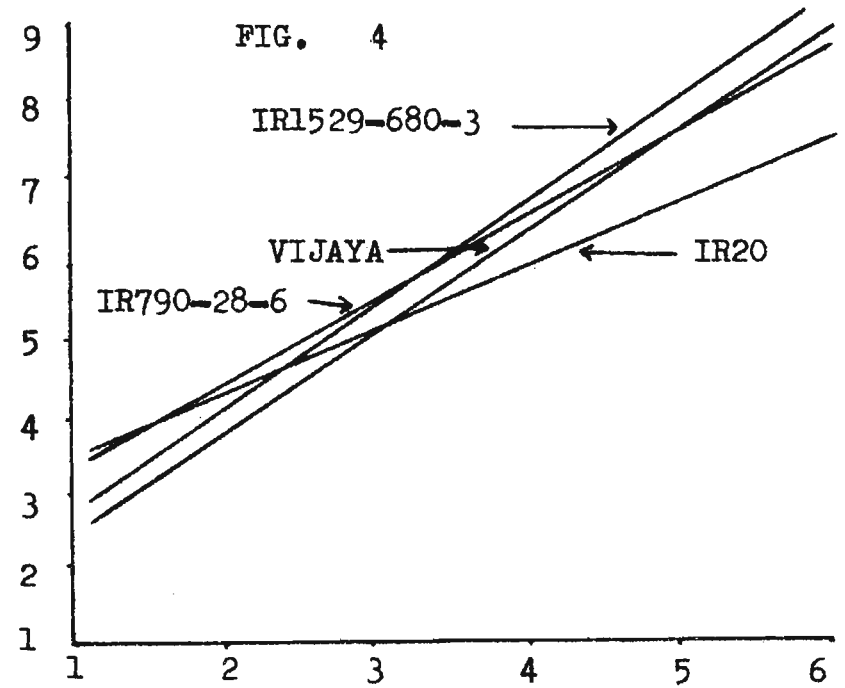


FIG. 5

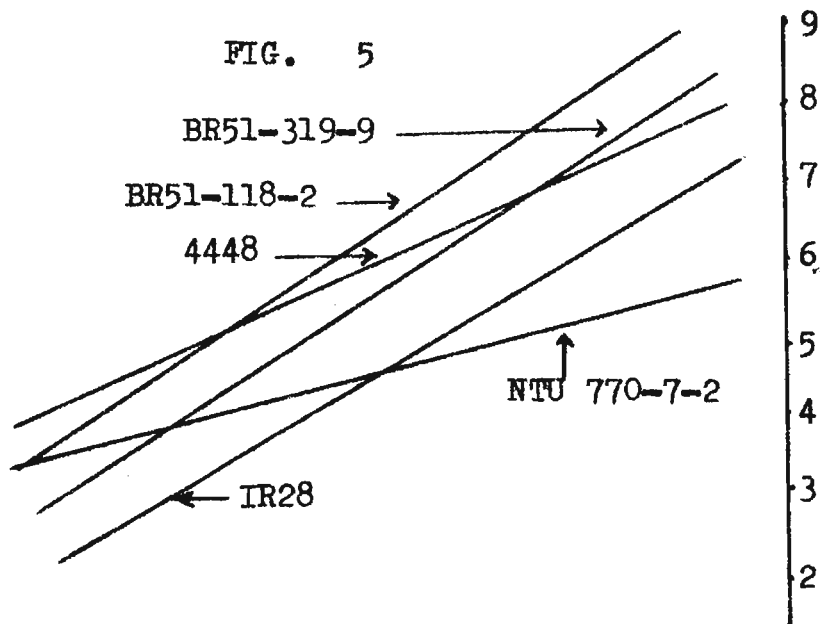
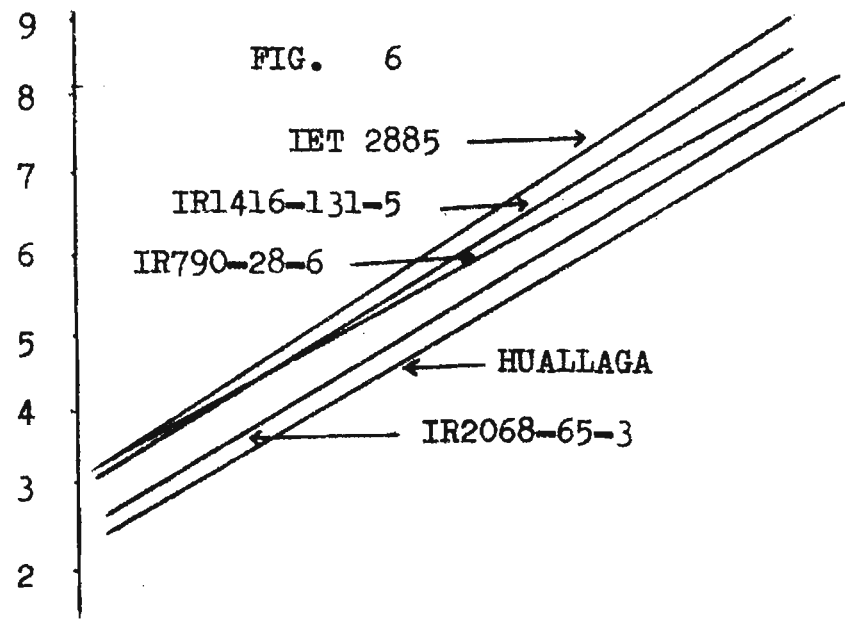


FIG. 6



WEED CONTROL TRIALS

A. Rainfed Conditions - Main Season 1977

The performance of the three best herbicide treatments at Sapu (The Gambia) Nyankpala (Ghana) and Rokupr (Sierra Leone) are presented in Table 1. The results showed that some herbicides performed as well as hand weeding as far as grain yield and weed control are concerned (STAM F34 at Sapu; MTB 3015, Avirosan and Tomariz at Nyankpala; and Avirosan at Rokupr). All the above herbicides gave higher grain yield than the control (no weeding or chemical)

B. Irrigated/Mangrove Swamp conditions Main season 1977

The trials were carried out at Valley du Kou (Upper Volta), Suakoko (Liberia) and Mange (Sierra Leone) under irrigated conditions while the Rokupr (Sierra Leone) condition was mangrove swamp.

Under irrigated conditions, the various herbicide treatments failed to give significant yield increases over the control. However, Amex and Saturn at Vallee du Kou; Herbazol and Amex at Suakoko; and Avirosan and Basagran (480g) at Mange performed as well as hand weeding with regard to yield (Table 2).

Under mangrove swamp conditions at Rokupr, Basagran KV gave significantly higher yield than the control. With regard to grain yield, Basagran KV, Amex and Destun + 2, 4-D performed better than hand weeding or weed free treatments (Table 3).

In general, all the trial sites had little weed problem during the 1977 season.

TABLE/TABLEAU: 1.

Grain yield and efficiency of three best herbicide treatments under rainfed conditions, Main season, 1977

Rendement et e'fficacite des trois meilllems traitements d'herbicides, riz pluvial, Principale saison: 1977.

Location/Site	Variety Variete	Control yield Rende- ment du temoin (kg/ha)	Grain yield(kg/ha) and Weed Control efficiency Rendement en grains (kg/ha) et degre de controle (%)								
			Yield Rendement	1st. Increase over cont. (%)	Weed cont. effic. (%)	Yield kg/ha.	2nd. Increase over cont.	Weed cont. effic.	Yield(kg/ha)	3rd. Increase over cont.	Weed cont. effic.
Sapu (The Gambia)	SE 302 G	698	Hand Weeding 21,40 DARE 2780	298	35.2	2683	284	100	2289	228	64.5
Nyankpala (Ghana)	IR 442	1390	MTB 3015G 2346	69	10.7	2271	63	32.1	2257	62	-25.0
Rokupr (Sierra Leone)	ROK 3	1109	Weed free 1969	77	-	1825	64		Weed- ing -2X 1644	48	-

TABLE/TABLEAU: 2.

Grain yield of the three best herbicide treatments under Irrigated/Mangrove conditions. Main Season 1977.

Rendement des trois meilleurs traitements d'herbicides riz irrigue/mangrove. Principale saison 1977.

Location/Site	Test Variety	Control yield Rendement du temoia (kg/ha)	Grain yield(kg/ha)/Rendement en grains(kg/ha)					
			1st		2nd		3rd	
			Yield Rendement	Increase over cont. (%)	Yield Rendement	Increase over cont.	Yield Rendement	Increase over cont. (%)
Vallee du Kou (Upper Volta)	IR1529-680-3	5310	AMEX 5703	7	Saturn 5578	5	Hand Weeding 3X 5555	5
Suakoko (Liberia)	2526	3445	Herbazonol 3627	5	AMEX 3498	2		
Mange (Sierra Leone)	Mange 2	2283	Avirosan 2544	11	Basagran (480) 2535	11	Hand Weeding 2X 2509	10
Rokupr Mangrove (Sierra Leone)	ROK 4	2774	Basagran (KV) 3472	25	3458	25	Destun + 2,4-D 3406	23

INSECTICIDE TRIALS

Rainfed:

The trial was conducted at Farakoba (Upper Volta) and Suakoko (Liberia). At both locations application of Furadan 3G failed to promote higher grain yield.

Irrigated (Off Season)

One trial was conducted at Richard Toll, Senegal, during the Off Season 1976-77. Application of Furadan 3G failed to give higher yield.

Irrigated (Main Season)

The trial was conducted at Vallee du Kou (Upper Volta), Korhogo (Ivory Coast), Suakoko (Liberia), Mange (Sierra Leone) and Djibelor (Senegal). At vallee du Kou and Suakoko, there was no beneficial effect of Furadan on grain yield. At Korhogo, two and three split applications of Furadan (1.2 kg a.i./ha) gave significantly higher grain yield than the control. The yield increases were 9% (with three split applications) and 12% (with two split applications). At Mange, three split dessings of Furadan (1.2 kg ai/ha) gave significantly higher yield than the control (25% yield increase over the control yield of 3.72 t/ha). At Djibelor, Furadan (3.6 kg -3 split, 2.4 kg - 2 split and 1.2 kg/ha .. 2 split) treatments gave significantly higher yield than the control (35.6 to 21.4% yield increases over the control yield of 3.9 t/ha).

Mangrove Swamp:

One trial was conducted at Rokupr, Sierra Leone. In this trial two split applications of Furadan (1.2 kg a.i/ha) gave significantly higher yield than the control (19% yield increase over the control yield of 4.09 t/ha).

SPECIAL PROJECTS AND TRIAL RESULTS

The special research projects of WARDA are located in Richard Toll/Fanaye in Senegal, Rokupr in Sierra Leone, Bouake in Ivory Coast and Mopti in Mali. They cover four major ecologies.

The special project in Richard Toll/Fanaye is on with irrigated rice, the Mopti project on floating and deep water rice, the Rokupr project on mangrove swamp rice and the Bouake project deals with upland rice under dry conditions.

The research project in Richard-Toll/Fanaye deals with variety improvement, Soil chemistry, entomology, weed control and crop physiology. The Rokupr project deals with variety improvement soil chemistry or soil science, entomology, pathology, and weed control. The Mopti project deals with variety improvement, agronomy, entomology extension & weed control. The Bouake project deals with variety improvement only.

Rokupr Mangrove Swamp Rice Project

Variety Improvement

The first task was to identify the varietal characteristics which local farmers favour and for this collection of traditional varieties from the Scarcies region and south of the country was made in early 1977. About 105 seed samples were collected.

The varieties collected from the farmers were shown to have the following characteristics:

- photosensitivity;
- good performance under unfertilized conditions; and
- low shattering, large panicles, blast resistance, tall stature and semi-droopy growth habit.

Collections of 20 and 30 varieties from Guinea Bissau and Nigeria respectively were made and these will be grown during the coming season. It is hoped to collect varieties from The Gambia and Senegal.

For short-term goal 350 varieties were screened. These varieties were assessed for height, duration, disease reactions, tillering ability, vigour, panicle length, lodging and general acceptability. On the basis of these characteristics, 50 varieties were selected for further testing. Unfortunately, none of the 50 varieties selected outyielded local varieties.

For the long term goal about 200 samples are available for full characterization and multiplication in the coming season. From these varieties local parents will be selected for the crossing programme.

Trials have also been carried out to identify good donors for salt and iron toxicity tolerance; parents with general adaptation to mangrove swamps and parents with high tillering ability. These parents will be used in the crossing programme in the coming season.

Entomology

Since there are no insect museums of rice pests in most WARDA member countries, a programme of insect collection and preservation has been initiated. This could be a source of reference to the interested scientists in the region.

Surveys of insect pests in the mangrove swamp of Sierra Leone and visits to the mangrove swamps of Guinea Bissau and The Gambia revealed the growth stage of rice when certain pests are important. During the nursery stage, Diopsis thoracica, Epilachna similis, termites Gryllotalpa africana, Heteronychus oryzae and Nephotettix, sp. are important.

During the tillering stage Diopsis thoracica, Epilachna similis Crabs, Chilo sp, Maliarpha separatella, Nephotettix sp, Bugs, Riptortus sp, and Aspavia sp, are important. During heading and flowering stages Diopsis thoracica, Chilo sp, Maliarpha separatella, Nephotettix sp, Bugs, Riptortus sp, and Aspavia sp. are important. At maturity, Maliarpha separatella, Bugs, Riptortus sp, and Aspavia sp. are important.

Studies on population changes of Maliarpha separatella showed the number to be very high between the end of September and the end of November.

Studies on the effect of time of planting on pest infestation showed that there was an early and highest intensity of infestation of the September and October plantings than that of July and August due to the high adult population during the former period. Early planting is therefore recommended to enable the plants escape from higher borcer infestation.

Various methods for controlling the stemborers Diopsis thoracica and Maliarpha separatella were investigated.

Varietal resistance studies showed that some varieties are resistant at maximum tillering stage but susceptible at later stages. However, in other varieties the reverse was true. There were some varieties that showed resistance at maximum tillering and later stages. In general, the local varieties which mature later than the introduced varieties tended to be less infested by Diopsis and heavily attacked by M. separatella, while Diopsis was more important in introduced varieties.

Brushing of the rice stubble had a significant effect on the survival of hibernating larvae of stemborers. The incidence of mortality was considerably higher in the brushed than the unbrushed fields.

Studies on the effect of nitrogen levels on the incidence of stemborer infestation showed that high levels of nitrogen induced higher infestation. Spacing studies also showed that the closer the spacing the lower the incidence of stemborer infestation.

Soaking of seedling roots in insecticide before transplanting did not reduce the infestation of stemborers and no differences in the grain yields between the treatments were noted. Foliar spray of insecticide also did not reduce the incidence of stemborers.

Newly transplanted rice seedlings in the mangrove swamp are frequently destroyed by crabs. Of the nine species collected on Rokupr experimental fields, and at four sites along the Great Scarries Sesarma huzardi is the most common and voracious.

S.alberti and S.curvatum also attack rice seedlings. Among the methods used by farmers to reduce the attack of seedlings by crabs are (a) the use of old seedlings, and (b) the use of large number of seedlings per hill.

In a bucket experiment, the extent of damage done to 30 day-old seedlings was about 3 times that done to 60 day-old ones.

Soaking of rice seedling roots in both Dursban and Furadan at a concentration of 0.06% a.i. caused high mortality of S.huzardi in a bucket experiment. Furadan was the most effective insecticide of all the insecticides tried and it showed low phytotoxic effect on the seedlings.

Pathology

In a survey work carried out in 1977 cropping season, the following diseases were recorded on the Great and Little Scarries: blast, brown spot, leaf-scald (Rhynchosporium oryzae), sheath blotch (Pyrenochaeta oryzae) sheath rot (Acrocyllindrium oryzae), udbatta, false smut and dirty panicles of unknown etiology.

Of the diseases recorded udbatta stood out as a potential destructive disease. Studies on its direct and indirect effects on panicle development have been initiated. Future work on the area of pathology will involve the following disease surveys, disease monitoring on breeders materials, biology of diseases studies on the epidemiology of major diseases and horizontal resistance to blast.

Soil Science

Monitoring of the salt content of soil and water between Rokupr and the sea revealed rapid clearance of salt from the water and the soil along the whole length of the river between mid-June and mid-July, and a gradual build up to toxic levels from late November down the river to early April at Rokupr

Soil sampling studies indicated that the clearing of the salt starts from the surface downwards.

The 1977 trial on injecting urea below the soil surface once using converted knapsack sprayer produced similar results as those obtained in 1976.

Comparison with sulphur coated urea (broadcast) showed that on the average there is little or no difference in effectiveness of the two sources of nitrogen supply.

Weed Science

Weed surveys in the estuary of the Great and Little Scarcies confirmed that *Paspalum vaginatum* is the dominant weed species in the mangrove swamps.

Crop losses due to weed infestation were assessed in farmer's fields. The results showed a loss in yield varying from 5-52% depending on the density of weeds. Areas where farmers will benefit by weeding will be identified during the next growing season. Adequate cultivation prior to planting has been shown to control weeds effectively in mangrove associated grass swamps.

RICHARD TOLL/FANAYE

Irrigated Rice Project

Varietal Improvement

In the 1977 growing season the agronomic characters of 400 introduced unimproved varieties of Indica type were studied. Eight varieties have so far been isolated and are being investigated further.

A comparative varietal yield trial, involving 6 cold-tolerant varieties, showed the superiority of IR8 in terms of grain yield.

A comparative variety and nitrogen fertilizer trials, involving 6 cold-tolerant varieties, showed good performance of five varieties. The grain yields of these varieties in the cold season ranged from 5 to 8 tons/hectare. The variety China showed a high degree of sterility.

Of 157 varieties (international nursery) screened for cold-tolerance, 14 varieties were retained for further investigation during the next cold season. Their growth cycle in the cold season ranged from 136 to 157 days.

Cold tolerance test of 100 varieties led to the selection of 47 varieties which will be further tested during the 1978 season.

Entomology

Work started in February 1977. The most important insects, based on their population and damage to rice plants, are the stemborers and defoliators. The seasonal fluctuations of insects in these two groups and other insect pests of rice is being studied.

Of five granulated insecticides tested for the control of alcyroid species, Furadan, Diazinon and Chloropyrifos proved very effective, while Lindane and Decis had no effect. Plots treated with the three effective insecticides gave yields 26 to 38 percent higher than the yield of the control plots.

Soil Science

A trial carried out in the dry cold season on the time of nitrogen application showed that split application (50% one day before transplanting, 25% at tillering and 25% at panicle initiation) was the most effective way of applying the nitrogen to rice. The trial also showed that where split application is not possible, application of the whole dose at tillering also gave good result.

In a nitrogen split application trial in the hot wet season the highest dose applied of 160 kg N/ha, in four splits, gave the highest yield.

Application of Mn and Cu gave 20% increase in grain yield.

In a manurial trial, involving the application of straw and ash during the hot wet season, straw had a depressing effect on yield. Ash had a beneficial effect on the three varieties used in the trial.

MOPTI

Floating and Deep flooded Rice Project

Varietal Improvement

The programme for the varietal improvement indulged in the following:

- (i) WARDA Coordinated trials;
- (ii) IRRI deep-water observation nursery;
- (iii) Comparative station trials;
- (iv) Evaluation of genetic material and hybridization; and
- (v) Observation of introductions.

The two station trials were carried out in deep and shallow flooded area. In the shallow area, two new varieties - Rajasail and Patuakhah were compared with their hybrids. Hybrids T442-57 and T442- were superior to the other varieties. The trials were affected by drought despite supplementary pumping. In the deep area, the trial comprised 10 Indian varieties. All the varieties gave very low yields due to bird damage. Of 28 introductions, all but one had good elongation character. A hybridization programme has been started and three crosses have been made

Weed Science

In the 1977 season identification and collection of weeds in fields of deep-flooded and floating rice continued. Collected weeds include 22 species belonging to 17 families and are now preserved in the herbarium. Gramineae are the largest family collected and they are by far the most harmful weeds in the ricefields.

Four wild rice species have been found O.longistaminata (rhizomatous wild rice), O.barthii, O.glaberrima (annuals) and intermediate form. Two Echinochloa species are present at the Station and these species create many problems in the paddyfields. Other weed species of importance in the paddyfields include Panicum anabpatistun, Brachiaria sp. and Sacciolepis cymbiandra.

The most dangerous broad-leaved weeds are Melochia corchorifolia, Aeschynomene Sensitiva, Sesbania, Sesban and Ipomoe aquatica. Cyperaceae are very numerous and are represented by Cyperus, Heleocharis and Pyoreus, Floating weeds are represented by Naptunia oleracca, Nymphaea lotus and Nymphoides sp.

Results of a survey carried out on farmers' fields revealed that the most troublesome weeds are O.longistaminata and O.barthii. Adoption of other agronomic practices to boost yield depends on solving the weed problem.

Entomology

Collection and identification of rice pests continued. Among the insects collected and identified, those that cause severe damage to rice include Maliarpha separata Rag, Chilo zacconius Blez (stemborers), Marasmia sp. (leaf-feeding pests) and Heteronychus oryzae (stem and root destroyer).

Results of two chemical control trials showed no significant difference between treatments as far as pest control and grain yield were concerned.

Agronomy

The agronomy programme focussed on nitrogen and phosphorus response, seeding density, method and time of seeding. Water shortage seriously interfered with nitrogen response. The optimum dose in this trial seemed to be about 90 kg of N/ha. Response of the rice varieties tested to increasing P application was not significant.

The density experiment did not show significant differences between treatments but sowing in 30 cm continuous rows was better than spacing at 25 x 25 cm, 30 x 20 cm, 20 x 20 cm, 30 x 30 cm, 25 x 20 cm, and 30 x 25 cm. The time of sowing experiment did not show any significant results between treatments owing to late and inadequate flooding.

Extension

A survey carried out to ascertain some factors affecting rice yields of Operation Rice Mopti project showed that there are five main problems:

- (i) climatic problems - shortage and poor distribution of rain
- (ii) agronomic problems - inadequate weed control;
- (iii) hydraulic problems - poor maintenance of irrigation canals
- (iv) financial problems - lack of equipment to carryout the necessary cultural practices and
- (v) biological problems - attack of rice by insects, birds and rats.

BOUAKE

Upland Rice Project

In 1976, the principal activities were:

- (a) selection from among plant material in F₄ and F₅ generations;
- (b) performance trials, including WARDA Initial Evaluation Trials; and
- (c) development of an apparatus and a method of screening for shattering resistance.

Results

- (i) Among early maturing varieties, IRAT 10 x IRAT 13 provided some lines that were superior, in yield and resistance to unfavourable conditions, to IRAT 10
- (ii) by contrast, IRAT 13 x Dourado Precoce and mutants of LAC 25-64 did not produce favourable results;
- (iii) among the medium and late maturing offsprings, Moroberekan mutants showed good performance;

- (iv) other crosses involving IRAT 13, line 13 and PI 215 936 as donors of short stem, especially in the cross IRAT 13 x Moroberekan, foreshadowed some lines with good general adaptability to rainfed cultivation;
- (v) in the miscellaneous performance tests, varieties included 5 from IITA and 3 from other sources;
- (vi) shattering studies showed that over maturity is a factor that increases shattering rate. It was recommended that shattering test should be made when the rachis is 3/4 yellow; and air humidity affects resistance to shattering.

Activities in 1977 were a continuation of previous studies. The selection work led to the naming of 13 varieties which were proposed to the WARDA network for further testing.

International trials carried out in 1977 included WARDA Initial Evaluation Test (IET); the International Upland Rice Observation Nursery of IRRI and the Upland Rice yield trials of IRRI.

SUPPORT TO NATIONAL RESEARCH

WARDA has given support to fourteen (14) national research programmes by the supply of minimal equipment to the total cost of 272,000 US dollars over the period 1975-1978, and in staff training particularly in support of the coordinated trials. An attempt has been made to evaluate the level of rice research activities in each WARDA member state (Table 1) so as to allow, in some measure, the planning of the level of assistance that will be needed by each Government. The over-riding concern at this stage is the level of support as translated into real rice production.

In strengthening national research activities towards the above goal, WARDA has been particularly concerned about developong a philosophy for assistance. This involves member Governments, Donor Agencies, Cooperating Organizations and International Institutions, and the capacity of WARDA.

MONITORING TOUR

As a follow-up of the decisions taken during the "Rice in Africa Workshop" in Ibadan and at the WARDA Annual Rice Research Review Meeting, March 1977 WARDA organised the monitoring tours of the WARDA region during 1977 and 1978. Five separate teams of scientists covered 14 member countries except Guinea which joined WARDA recently. The terms of reference for the monitoring tour were as follows:

1. Prevalent rice diseases and their intensities in different areas.
2. Insect pests and their extent of damage.
3. Major existing varieties and their limitations.
4. Soil problems affecting rice production.
5. Environmental constraints.
6. Other production constraints.
7. Scopes for improvement as in 1 to 6.
8. Recommendations.

R=Rainfed, D=Deep Flooded, I=Irrigated, F=Foreign, M=Mangrove,++++=Highest score
 Poor=0-1, Fair/Satisf=4-5, V.Good = 8-9, Weak=2-3, Good= 6-7, Excellent = 10

TABLE: 1

STATUS OF RESEARCH IN MEMBER STATES (1978)

Country	Lan- guage	Rice area in 1000 ha	Research Infra- struc- ture	Local Person- nel	Re- search pro- gramme	Types of rice	Road commu- nica- tion from regional Head- quar- ters	Living Condi- tions & social facili- ties at main Res- earch sta- tions	Nearness to regional Research Stations
Mauritania	75% French	1.06	weak	poor(2F)	weak	I	easily accessi- ble	+	+++
Senegal	25%	89.5	good	satisf.	satisf.	IRM	except perhaps G. Bissau	+++	++++
Gambia		24.3	satisf.	poor(1F)	satisf.	IRM		+++	+++
G. Bissau		- <u>114.86</u>	weak	poor(1F)	weak	IRMD		+	++
S. Leone	English	370.00	good	good(2F)	good	IRMD	easily	+++	++++
Liberia	"	170.00 <u>540.00</u>	fair	satisf.	satisf.	IR	accessi- ble	+++	+++
I. Coast	French	340.0	good	weak(??F)	satisf.	IRD	-do-	+++	++
U. Volta		42.4	v. good	poor(2F)	satisf.	IR		+++	+
Mali		224.1 <u>606.5</u>	fair	satisf.	satisf.	IRD		++	++++
Togo	French	10.8	being const- ructed	weak(1F)	weak	IR		+	+
Benin		7.1	good	weak(1F)	weak	IR	-do-	++	+
Niger	"	17.0 <u>34.0</u>	good	weak(?)	defired but yet to start	ID		+++	+
Ghana	English	81.0	good	fair(?)	satisf.	IR	-do-	+++	+
Nigeria	"	290.0	good	good(?)	good	IRMD		+++	++

9. Any other issue the teams might like to include.

The reports of the monitoring teams are being compiled and edited and will be ready in 1979.

COOPERATIVE PROGRAMMES

WARDA/OCLALAV

Two missions to member states to assess the extent of bird damage to rice were undertaken. The first mission visited Ghana, Sierra Leone, Togo, Benin and Nigeria between April 2 and May 18. Members of the first mission were:

Dr. A. N'Diaye) - OCLALAV
Mr. A. Quattara)
Mr. H. Van Brandt) - WARDA
Mr. A.S. Adegoke)

The second mission visited Liberia, Ivory Coast, Upper Volta, and Mali between June 18 and July 31. Members of the second mission were:

Dr. A. N'Diaye) - OCLALAV
Mr. A. Quattara)
Mr. S. Assegninou - WARDA

The report of the mission was presented to the STC Committee in October and after discussing the paper, it was felt that a project should be designed to provide a satisfactory answer to the problem of grain-eating birds, which will lead to a reduction of economic losses. It was also felt that rodent control should be considered, and that an integrated approach of the two problems could be envisaged. The detailed projects and methods of execution will be decided upon by WARDA OCLALAV scientists at a meeting to be arranged in June 1979.

WARDA/University of Louvain

A proposal for collaborative Research on Azolla and Blue Green Algae by the University of Louvain and WARDA has been sent to Belgian Government for financing.

The purpose of the research is to reduce the use of chemical nitrogenous fertilizers to rice fields in West Africa and to stabilize and improve the rice soil nutrient status for higher and continuous productivity of lowland rice by the use of Azolla and Blue Green Algae. The Belgian Government has offered a nine month fellowship for this purpose.

WARDA/ICIFE

In a mutually cooperative and collaborative programme WARDA and ICIFE are to initiate useful research on stem-borers to discover new knowledge that will lead to development of appropriate pest management strategies for farmers in the tropics. The Agreement to effect this cooperation was signed by WARDA and ICIFE and donors are being located to fund the project. The main objectives are:

- Survey of the agro - ecological distribution of rice stemborers.
- Understanding of the stemborers complex interaction with rice plant.
- Study of seasonal biology and abundance of the stemborers.
- Screening for rice varieties resistant to stemborers.
- Assessment of crop losses due to stemborers.

WARDA/Sahel Institute

The Sahel Institute and WARDA are to develop a rice based farming system research in the Sahelian zone. Discussion on this project has already been held between the Research Coordinator of WARDA and the Director of the Sahel Institute in Mali. The Sahel Institute is now trying to find donor agency for the project. Other Institutes that have agreed to collaborate in the studies are ILRAD in Kenya and IITA in Nigeria.

WARDA/IRRI/IITA

Twenty Field Assistants from member countries were trained at IRRI on Genetic Evaluation and Utilization (GEU) in 1978. It is planned to initiate a similar course within the region because of the very high demand that Asian countries are making on IRRI for this course.

Dr. A.O. Abifarin, Senior Plant Breeder at IITA was seconded to WARDA in September 1978 for a period of two years with an option for extension by mutual agreement. Dr. Abifarin will assist the Research Coordinator and the Rice Breeder in the technical aspects of their activities. He is to act as Principal Liaison Officer between WARDA and IITA, IRRI, IRAT and other International Rice Breeding programmes.

DEVELOPEMENT PROGRAMME

The WARDA Development Department carries out activities with direct and indirect impact on rice production programs in WARDA member countries. Activities with direct impact include development planning, project identification, preparation, appraisal and evaluation and implementation; consultancies and expert advice; demonstration projects; training and seed multiplication. The activities with indirect impact deal mainly with collection and dissemination of relevant rice information, and the conduct of studies, which include rice statistics yearbook; general, sectorial and case studies; visits; seminars and missions. The Rice Storage and Processing Division was reactivated in 1978 with two experts from Japan.

A. Direct Assistance to Member Countries

Seven member countries requested and received direct assistance from WARDA.

1. The Gambia

WARDA helped The Gambia to supervise the feasibility study on the development of the Jackhally and Patcharr plains. WARDA has previously helped prepare the terms of reference for the study in 1976. The first phase consisted in the collection and processing of physical (topographical, pedological, hydrological, rainfall) and socio-economic data with a view to proposing a certain number of development and operation alternatives for the Government to make a choice.

WARDA contributed to this first phase of the study through its analysis and comments on the preliminary report prepared by the consulting firm and through two field missions carried out by the Head of the Development Department. After the consultant firm submitted its report, a team composed of WARDA's Head of the Development Department, Senior Economist and Rural Engineer prepared and submitted detailed comments which helped the Government make its choice for the final feasibility study.

2. Guinea Bissau

In November 1975, WARDA dispatched a multi-disciplinary mission to Guinea Bissau. The mission's report: "Contribution to a Rice Development Strategy in Guinea Bissau" serves as a guide line for the planning of the country's rice programme.

At the invitation of the Government of Guinea Bissau, the Head of the WARDA Development Department carried out a mission in November 1977 to assess the stage reached in the implementation of the recommendations and analyse the results achieved. It appeared that two projects could already be identified: one for mangrove swamp rice in the South and the other for the cultivation of irrigated rice in the North, with fullwater control by pumping or by gravity.

WARDA further assisted Guinea Bissau through two missions carried out by the Rural Engineering Division to make topographic surveys and conduct implementation studies for the seed multiplication and pre-extension farm in Contuboel and the Domingos-Ramos Cooperative. The second mission was undertaken by a consultant seconded to WARDA by the French Government.

Finally, WARDA helped Guinea Bissau select dehullers suitable to the conditions prevailing in the Southern coastal area where there are already marketable surpluses of paddy rice.

When the equipment is received, WARDA will help to assemble it and train staff for its operation and maintenance.

3. Liberia

During the period under review, WARDA assisted Liberia through its analysis and comments on the feasibility report for the Cestos project. This was done by a multi-disciplinary team composed of the FAO Senior Adviser, the Head of the Development Department, the Senior Economist and the Breeder from the Research Department.

In its comments, WARDA, while confirming the great agricultural potential of the project area, pointed out to the Liberian Authorities the over-optimistic trend of the objectives and the risks involved, at the technical, economic and management levels, in the implementation of the project as proposed. Although the Liberian Government decided ultimately to suspend the project, WARDA's contribution cannot, however, be regarded as negative.

WARDA also helped Liberia supervise the setting-up of the commercial rice mills acquired by the Liberia Produce Marketing Corporation (LPMC), a Government agency. Our experts will assist subsequently in the training of staff to ensure the proper running and maintenance of these rice mills.

Lastly, WARDA continued to second an associate extension specialist for the project of the FAO Technical Assistance programme to support the Liberian government's efforts to improve upland rice cultivation. This project succeeded in training, within one year, 137 extension officers in seven three-week courses.

The project also successfully conducted demonstrations in farmers' fields. Although the project ended officially in April 1978, the associate extension specialist continued to lend his services until August, to follow up the trainees.

4. Mali

WARDA assisted the Office du Niger of Mali to improve its system for the collection and processing of socio-economic data. This is just the right moment especially as a vast intensification project is being planned and an accurate appraisal must be made of the work periods, yields, the project's profitability to the community as well as to the individual and of the various proposals that will be made for intensification. The senior economist is in charge of this activity. WARDA will assist the Office du Niger in the implementation of the recommendations made.

Among other things, it made available to the Office du Niger, for a period of eighteen months as of October 1978, the services of a Zairian economist who is collecting data for his thesis at the University of Michigan. WARDA hopes to obtain from this study, a methodology for surveys applicable to the majority of rice projects in the region.

In the context of a familiarization mission to the Office du Niger, the two rice processing engineers also tackled problems, common to all the Sahelian and Sudanian zones, caused by the extreme dryness of the air resulting in a high rate of broken rice which decreases the market value of the produce.

5. Niger

The assistance given to Niger involves the feasibility study on the Saadia-Aval seed farm. WARDA conducted the feasibility study in its entirety: rural engineering, agronomy, economy. The study has been completed and WARDA is now endeavouring to procure financing for the implementation of the project.

6. Nigeria

WARDA continues to lend the assistance which it gave the previous year for the Peramabiri redevelopment project in the River State. A mission composed of the FAO Senior Adviser, the Rural Engineer and the Financial Analyst was sent there in December 1977. Although it was a short visit, the mission was able to assess the current state of the area and the proposals made by the consultants who had worked previously on the project.

In response to a request from the National Cereal Research Institute (NCRI), the Processing Engineer undertook a mission to Nigeria to investigate the reasons for the poor quality of the local parboiled rice and make recommendations. The fact that imported rice is preferred to the local rice constitutes an impediment to the development of the local rice production program. The reasons appeared

to be complex: mixing of rice varieties including the Glaberrima species, unripe kernels or kernels that have been damaged by insects, prolonged soaking in cold water and the like. It seems that solutions have been found since the Badeggi research station has already produced, on an experimental basis, very high quality parboiled rice and a commercial rice mill which soaks the rice in hot water and screens unripe kernels, obtains rice of a quality comparable to the imported rice. The solution should therefore be sought in the extension of known techniques and assistance to the farmers: frequent renewals of seeds, protection against insects, incentives for the production of good quality homogeneous paddy, organization of marketing and so forth. The mission report was submitted to the National Cereal Research Institute.

It should be mentioned that the problems of the quality of locally produced rice and the technical and economic management of the rice mills are common to all WARDA member countries. They should be given special attention, otherwise farmers might become discouraged.

7. Togo

The Agro-economist of the Development Department continued the study undertaken the previous year on the detailed analysis and comparison of the various systems of rice production in Togo. The provisional document of the study has been submitted to the Togolese Authorities. It is hoped that it will provide useful guidelines for the selection of projects and the adoption of measures to speed up rice development in that country.

B. Cooperation with International Financing Institutions and Inter-Governmental Agencies

Upon the request of the World Bank, WARDA took part in a mission to identify a project concerning intensification of rice cultivation at the Office du Niger. This helped to speed up the implementation of the project considerably. A technical assistance and consultancy project aimed at

carrying out urgent research, test and finalize techniques for subsequent large-scale application. The project will also conduct feasibility studies for the redevelopment and intensification of the Office du Niger rice project whose final objective is to obtain an additional annual increase of about 60,000 tons of paddy.

At the invitation of the Inter-State Committee for Drought Control in the Sahel (CILSS), WARDA attended the meeting of the Working Group on Irrigated Crops at the Club du Sahel, in September 1978.

WARDA also took an active part in the meetings of West African Inter-governmental Organizations held under the auspices of ECOWAS.

In January and February 1978, WARDA participated in a four-week mission of the International Labour Organization - Jobs and Skills Programme for Africa (ILO-JASPA) to carry out a study of rural employment in Sierra Leone.

C. General and Sectorial Studies

a) Study of the Political Economy of Rice in West Africa

This study, conducted in conjunction with the Food Research Institute of Stanford University and financed by USAID, has been under way since October 1976. The collection of data in the field ended in January 1978. Stanford University contributed one senior economist and five research assistants with the support of three senior economists, working full time on the study. WARDA contributed two economists who were exclusively responsible for covering three countries, apart from their contributions to the entire study.

During 1978, the entire Stanford team has been busy analysing the data collected. The Senior Economist and the Agro-economist from WARDA made their contribution during missions to Stanford University. A preliminary report containing a synthesis of the study was submitted to the Eighth Sessions of the Scientific and Technical Committee and the Governing Council. The final report is scheduled

for early 1979. Country or separate reports will be prepared by individual researchers.

We hope to discuss and utilize the findings of this study at a seminar to be held in October 1979 on Strategies for Rice Development in WARDA member countries.

b) Classification of Types of Rice Production in West Africa

The classification was completed as recommended by the Scientific and Technical Committee meeting. It was submitted to the 1978 WARDA Annual Research Review Meeting. The consensus was that the proposed classification should be adopted with provision for future amendments, if and when necessary.

c) Post-Harvest Survey

This survey was done in 1976. The reports on the 1976 survey were prepared and submitted in 1977 to member countries for their comments. These were received and in 1978, Mr. Rozeboom, the former Associate Processing Engineer kindly agreed to finalize the reports. WARDA has also obtained FAO cooperation to edit them. The reports will therefore be ready for distribution in 1979.

D. Statistics

During the latter half of 1977, all member countries were visited for the collection of data on the rice economy. Our staff received, during these visits, maximum cooperation from the officials concerned. The statistical data obtained during these visits and those received later enabled us to have, for the first time and within the first three months of the year, reliable and accurate data on rice production and imports of the whole region for the previous year.

This is why the rice statistical year-book could be compiled by May 1978. Unfortunately, the printing of this document containing more than 500 pages has not yet been possible. Nevertheless this delay has been partly compensated for by the printing and distribution of a synoptic

report of about twenty regional tables. It would, in fact, be advisable to generalize this procedure, in other words, issue annually, around July, a synoptic statistical document and publish a detailed yearbook only every three or four years.

E. Collection of Information on the Situation, Conditions and Prospects of Financing Rice Projects in West Africa

In this connection, our financial analyst visited over twenty financial institutions in Africa, Europe and North America, this year. He was welcomed everywhere and collected useful information. It appears that WARDA member countries have not yet taken advantage of the great potential that exists for the financing of rice development projects.

On the basis of the documentation compiled, WARDA plans to prepare a publication on the financing of rice projects. The World Bank has already offered its assistance in editing.

F. Seminar

In pursuance of the recommendation of the Seventh Session of the WARDA Governing Council, a seminar on "The Reinforcement of the Rice Growing Potential of WARDA Member Countries - Adaptive Research, Seed Multiplication, Training" was organized in Monrovia from 21 to 25 August, 1978. During this seminar

member countries discussed and made recommendations for WARDA action in the areas of adaptive research, training and seed multiplication. WARDA will follow-up these requests in the following year by the preparation of feasibility studies, and helping member countries seek the necessary finance for new projects.

G. Missions for the Evaluation and Programming of WARDA's Activities

This year, WARDA received several evaluation and programming missions from cooperating countries and organizations. The Development Department was especially involved in the following missions:

1. USAID Evaluation Mission, was undertaken with our participation between February 17 - March 29, 1978, to review WARDA Training and Special Research Projects.

2. Evaluation Mission on the Economic Impact of the Regional Seed Multiplication Centre, carried out by a consultant from the French Ministry for Cooperation, from May 25 to July 15, 1978. The FAO Senior Adviser and the Head of the Development Department organized tours of member countries for the consultant, obtained the necessary information for him and discussed his findings with him.

3. Joint UNDP/FAO/WARDA Evaluation Mission of WARDA's Development Activities. This mission took place from July 17 - 29, 1978 and involved the assessment and planning of WARDA development programs. The Senegalese Government kindly agreed to place Mr. El Hadj Oumar Toure, Director General of the Societe pour la mise en valeur de la Casamance (SOMIVAC) (Casamance Development Corporation) at WARDA's disposal as a consultant for the entire duration of the mission.

4. Quinquennial Review Mission of the Consultative Group on International Agricultural Research, 1 to 6 September 1978

This mission concentrated mainly on research programmes. In view of the integrated nature of WARDA's activities, however, the Head of the Development Department was asked to take part in the mission.

The various evaluation and programming missions proved to be very useful. They provided the opportunity to:

- a) take stock of activities;
- b) consider, with a critical mind, the impact of these activities in relation to WARDA's fundamental objective; namely to make West Africa self-sufficient in rice; and
- c) make proposals to enhance our organization's effectiveness.

H. Support to other WARDA Departments

During the year under review, considerable efforts were made to ensure greater integration of WARDA's activities. The Development Department was associated regularly with the activities of the Research Department. All the experts of the Development Department, each in his own field, gave courses at the Regional Training Center.

The Development Department was closely associated with the preparation of the rice project management course

given at the beginning of 1979 in Ouagadougou with the cooperation of the Pan-African Development Institute (IPD). The Senior Economist of the Department spent two weeks in Ouagadougou in September 1978 with the IPD. The two Processing Engineers took an active part in the preparation of the two training courses to be held on rice processing in 1979.

I. External Projects

a) Seed Multiplication Centre (Richard Toll)

In 1977, 39.9 ha were cultivated by the Centre (16.9 ha during the off-season and 23.0 ha during the main season), yielding 64 tons of paddy which, after screening and cleaning produced 50.650T of foundation seed.

The low average yield of 1.6 t/ha is explained by insufficient land levelling, the occurrence of salinity in patches, but mostly by the damage caused by birds. Despite the intervention of OCLALAV in destroying the queleas in their roosting places, the damage caused by these birds may be estimated at 50-60% of the yield potential of certain plots.

Foundation seeds were distributed as follows:

Benin	140 kg
The Gambia	16,070 kg
Guinea Bissau	686 kg
Ivory Coast	100 kg
Mali	50 kg
Mauritania	54 kg
Niger	550 kg
Nigeria	12,050 kg
Upper Volta	50 kg

29,750 kg

There remained a stock of seventeen tons of seed made up of varieties that did not correspond to member countries' demands since we still do not receive the list of their requirements in time, for incorporation in the planting schedule.

We now have 65 hectares levelled and equipped with an irrigation network and drainage. There are still ten hectares of plots with considerable differences in level, high salinity and acidity which remain to be reclaimed.

The 1978/79 agricultural season which started in mid-July covered 43 hectares in the main season. In compliance with the recommendation of the 1978 session of the Scientific and Technical Committee, a wider area was planted with rainfed varieties.

Out of a total area of 43 hectares, 2.4 were planted with selected varieties on 400 m² plots.

It is hoped that the damage caused by birds will be lessened by reducing the harvesting period as a result of a tractor-drawn mower-baler recently acquired. The production target for 1979 is 75 tons of foundation seed.

b) Rice Mechanization Project (Richard Toll)

The associate mechanization specialist stationed in Nianga is carrying out a comparative study of the three types of mechanization in the Senegal River Valley.

- Niange type: large-scale mechanization with mechanical work done for the small-scale farmers by the SAED.

- Cooperative type: (Cuma): mechanization covering 50-100 ha subdivided into small holdings of about 2 ha each. The equipment used is generally smaller than the above type.

- Matam type: where all the work is done manually.

The study covers performance of the equipment, costs, profitability and so on. It will continue until the end of 1979. However, it has been possible to draw certain conclusions already. For example, the use of the combined rotavator-seeder is justified both technically and economically.

TRAINING PROGRAMME

The West Africa Rice Development Association (WARDA) conducts two basic non-degree annual training programmes. Apart from these two basic courses, specialized courses in different rice disciplines are offered during the year to meet the demands of WARDA member countries. Most of these courses are held in the J.T. Phillips Jr. Regional Training Center in Liberia. WARDA also sponsors students for training and research at the degree level in Universities within and outside the region. To ensure relevant application of acquired skills by graduates in their respective countries, WARDA has instituted a follow-up scheme.

The Field Assistants Course (FAC) is a six-week training activity designed to produce Research Assistants by imparting experimental techniques to them. It is one of the basic courses which supports the Coordinated Trials, National Research efforts and WARDA Special Projects. The course ensures uniformity, standardization of and observations of trials. The 1978 Field Assistants Course started January 23 with thirty-three trainees from thirteen member countries. Seven graduated with "distinction", eleven with "satisfaction" and fifteen with "participation". Trainees who did not possess certificates in Agriculture did not perform well in the course. Plans have been made to improve the quality of the trainees.

Rice Production Specialist Course (RPSC) is the second basic course conducted every year, for six months. This course is intended to produce for the member countries rice production specialists, research technicians, extension officers and trainers in the principles and practices of modern rice technology. It is a high level course geared for B.S. degree and Diploma holders with some experience in the field of rice production or research.

A selection team from the Training Center interviewed and screened candidates in the member countries for the course. Thirty-six candidates were selected from thirteen

countries but thirty enrolled in the rice production course. Out of this number 12 were B.Sc degree holders, 15 Diploma and only three certificate holders. The high degree of homogeneity in the academic standard of the trainees substantially improved the quality of the 1978 course. The 1978 Rice Production Specialist Course started May 1 and ended October 30, 1978.

Due to the fact that the Rice Specialist Production course is intended to produce a well-versed individual in the theory and practice of rice production, 50 percent of course time is spent in the classroom on theory, and 50 percent in the field on practice. Thus mental and manual skills as well as diagnostic and identification skills are emphasized. Extension and communication skills related to rice production also feature prominently in the course.

Eighteen (18) instructors and scientists lectured in the 1978 RPSC. Five permanent instructors of the Training Center, nine Headquarters staff and four staff from the sub-regional programs. Besides the WARDA staff, renowned scientists were invited to lecture on special topics.

The trainees organized in the field, individual production plots and applied research trial plots, with the objective of identifying problems common to most West African farmers under upland and irrigated conditions. Mangrove, deep-flooded and floating rice conditions were dealt with through lectures in the classrooms. A five-day excursion was undertaken to tidal mangrove rice growing areas in Sierra Leone to observe the mangrove ecology and the technology in use. A two-day observation tour was made to the Liberia Central Agricultural Experimental Station in Suakoko. A similar excursion is planned for deep-flooded and floating rice in Mali for 1979. The trainees organized the following trials under upland and irrigated conditions:

Upland Conditions

Weed Control Applied Research Trial

Insecticide Screening Applied Research Trial

Variety Applied Research Trial

Nitrogen x Variety Applied Research Trial

Irrigated Conditions

Spacing Applied Research Trial

Stand Establishment Applied Research Trial

Variety Applied Research Trial

Insecticide Screening Applied Research Trial

The students also organized and conducted a Field Day when their rice crop was at the reproductive stage to exchange views with researchers, extension workers, administrators, students and farmers attending the demonstration. The 1978 Field Day was attended by the CGIAR/TAC Quinquennial Review Team.

To test the degree of comprehension by the students and their ability to transfer acquired knowledge to others, a two-week intensive Rice Production Course was planned and conducted by the trainees for 40 extension aids from various agricultural projects in Liberia.

Apart from the two basic courses (Field Assistants and Rice Production Specialists) one specialized course was offered in 1978 on Rice Seed Multiplication and Certification. The objectives of the course are to:

relate varietal improvement of rice with genetic principles;

train the participants in the basic principles of seed production and certification;

identify the minimum standards of seed multiplication, storage and handling for the different classes of seeds.

The six weeks Seed Multiplication and Certification Course was organized for 28 participants and took place between November 6-December 15, 1978. It was conducted by the following guest-lecturers:

Professor J. Bouharmont Botany and Breeding
Catholic University of
Louvain, Belgium

Dr. M. Bono Seed Multiplication
IRAT/CERCI
Upper Volta

Mr. R. Vandevenne
IRAT/Bouake
Ivory Coast

Seed Quality and Control

Mr. M. Diarra
Kogoni Station
Mali

Demonstrations

The follow-up scheme to assess the impact of WARDA training efforts in member countries was conducted for some of the Francophone countries in 1978 because of staff shortage, the rest will be covered in 1979. Twenty-one (21) graduates of previous WARDA courses were contacted and interviewed in Benin, Ivory Coast, Niger, Togo and Upper Volta. Fifteen of these graduates are directly engaged in rice work, while four are indirectly engaged in rice. The rest are not engaged in any rice related work. Thus 90 percent of the graduates are productively engaged in rice work. It was discovered that member countries usually appoint graduates to managerial positions rather than employ them in training activities. This problem will exist as long as there is a dearth of trained manpower. WARDA has to therefore intensify its training efforts.

Two courses have been planned to take place outside WARDA Training Center in 1979. Project Management Course and Water Management Course will take place in Ouagadougou with assistance of the Pan African Institute of Development (PID) and Ecole Inter-Etats des Ingenieurs de l'Equipe-ment Rural (EIER) respectively.

In addition to the WARDA organized and sponsored courses, the Association also granted fellowships to its staff and staff from Member Countries to attend degree and non-degree courses at regional and non-regional institutions. Five and two graduate degree scholarships obtainable at institutions outside the region were offered to staff of Member Countries and WARDA respectively. WARDA utilized its two fellowships, but the Member Countries have only utilized one of the five scholarships. Also, six WARDA staff and twenty from the Member Countries went

under short-term specialized courses. Under WARDA supervision, a Ph.D Research Fellow is undertaking a socio-economic survey of rice production at the Office du Niger in Mali.

A Training Department was organized and a Director appointed in November 1978 to properly organize and intensify WARDA's manpower development programme.

DOCUMENTATION AND COMMUNICATIONS PROGRAMMES

The information services of WARDA are provided by two main divisions - Documentation and Communications.

A. Documentation Centre

The objectives of this Centre are to collect, process and disseminate information on methods applied, experience gained and results obtained on rice production and marketing both within and outside West African region.

1. Equipment

Due to expanding collection both for the library and microfiche laboratory, additional shelves were installed in all rooms. More readers were ordered for the member countries.

Card catalogue cabinets and other library equipment were also ordered both for the GHQ and the library at the Training Centre.

2. Contract for Computerized Programming of Indexes

Renegotiation for renewal of contract with Bong Mine Company was done in early January but due to the introduction of a new IBM 370 computer system at Bong Mine Company, the index programmes had to be rewritten completely into PL 1. It is hoped that with the return of the Acting Head from his information science training later this year, the software will be improved to include vocabulary processing and with possible on line retrieval facilities for compatibility to the new FAO Agris system of indexing.

3. Publications

A comprehensive periodicals inventory list was produced. Accession lists are published quarterly for internal distribution.

4. Library

For the Headquarters, Special Research Stations and the Training Centre, an approximate total of 800 books were ordered. The Question and Answer Service received innumerable requests based on the Indexes.

Emphasis was given to the inventory of periodical

holdings when the second UN Volunteer arrived. Presently there are 650 periodicals (titles) available in the library, half of which are active.

To make the library at the Training Centre functional, reorganization was done. Shelves were installed to accommodate newly ordered books. Bilingual brochures of the library's guidelines and list of collection were distributed to the trainees as well as to the staff.

5. Exchange of Publications

There is a steady flow of documents mostly on exchange basis. The mailing list has a total of 600 addresses. Exchange relation have been established with almost all the major agricultural libraries and documentation centres in WARDA countries.

6. Microfiche Laboratory

The main function of this laboratory is to produce microfiches and to carry out photographic activities of WARDA including reproduction of documents and microfiches for the Question and Answer Service.

During the year the laboratory assisted considerably in producing diapositives and pictures for WARDA research meetings and conferences.

A research data bank is in the process of being established in collaboration with the Training Centre with the primary objective of storing insect and plant collections. With financing from CGIAR about \$15,000 worth of equipment, spare parts and some supplies had been purchased for the operation of the photolaboratory and microfilm readers.

7. Training

Another training course was completed on microfilming operations at the Centre by a trainee from the Ministry of Public Works of Liberia. It is foreseen that more training courses will be requested in the future by the member countries judging from the current trend of information awareness in West Africa. In connection to this,

the Senior Indexer is currently undergoing a year specialization study on information science.

8. Outside Contacts

The Centre is participating in the Sahel Documentation operations entrusted to the Michigan State University under USAID contract. It is also a member of the International Editing Board of the Sahel Bibliographic Bulletin and a member of the Inter-State Council of the Sahelian heads of documentation centres.

9. Other Activities

The Documentalist from BIS (OAU) in Bangui visited the Centre in June. It was on consultation mission and system study with WARDA for the establishment of information network in the Sahel Region.

B. Communications

The activities of the Communications Division fall essentially under the following headings:

- 1) Translation, and occasionally interpretation.
- 2) Editing.
- 3) Publications, including the graphic aspect of documents preparation.
- 4) Language Laboratory.
- 5) Public relations.

1. Translation

The main items, this year, were the Annual Research Report, and the reports submitted during the Review Meeting, Reports of delegates and WARDA staff, Reinforcement Seminar Papers, Scientific and Technical Committee (STC) and Governing Council documents; Seed Multiplication Project Management Lecture Notes.

2. Editing

This remains a weak point, since it has not been possible to find and recruit scientific editors. This has resulted in the discontinuation of the quarterly newsletter, in delays in the regular updating of WARDA, what it is and other general information documents, and generally in delays in the publica-

tion of seminar proceedings. However, efforts have been intensified to recruit a scientific editor. This could speed up the release of a number of publications, and eventually lead to the publication of a regular journal.

3. Publications

Two offset operators have completed a practical training course, at the Ministry of Information, Monrovia. Together with two assistants, they are in charge of printing, compiling and binding operations. The offset machine will start printing operations this year.

The distribution of documents in member countries has improved, since the sub-regional coordinators have been requested to assist. A number of publications are distributed during their missions in member countries, instead of being mailed, which proved to be at the same time expensive, not always reliable, and usually very slow.

No progress has been made on the financing of a post of graphist, although it would be essential to recruit a professional to ensure a proper supervision of the printing shop, to improve the overall graphic quality of the publications, and to expand the public relations activities.

At this point, mention can also be made of the fact that the permanent shortage of francophone secretarial staff still delays or holds up a number of publications, in particular several seminar proceedings. Local recruitment of qualified staff, at present WARDA's salary scale, has definitely proved impossible, and alternate solutions will have to be found.

The following list includes main documents published in 1978:

1. Rice Workshop in Sierra Leone.
2. Report of a Mission to Appraise the Agricultural Data Collection System of the Office du Niger.
3. Atelier sur le riz en Sierra Leone.
4. Perspectives du commerce intra-régional du riz en Afrique de l'Ouest (ADRAO-IRA de l'Université de Stanford).

5. Appropriate Technology for Food Production and Processing in ECOWAS Member Countries.
6. Ferme Semenciere de Saadia Aval:
 - Doc. 1. Memoire descriptif
 2. Cubatures
 3. Cotes
 4. Quantités de béton, maçonnerie, matériaux divers et équipement de la station de pompage.
 5. Devis estimatif.
7. Prospects of intra-regional trade of rice in West Africa (WARDA-Stanford University Food Research Institute).
8. Etude des aspects économiques du développement de la riziculture au Togo.
9. Annual Research Report, Volume I, Coordinated Trials, and Volume II, Statistics.
Rapport Annuel sur la Recherche, Volume I, Essais Coordonnés, et Volume II, Statistiques.
10. 1977 Rice Research Situation in the WARDA Region.
11. 1976 Rice Research Situation in the WARDA Region.
12. Aménagement du bas-fond de la coopérative Domingos-Ramos, Guinée Bissau.
13. Final Report of the Rice Research Review meeting -
Rapport Final de la Réunion sur la Recherche Rizicole.
14. Report of the Joint UNDP/FAO/WARDA Review Mission on Project RAF.75/022: Assistance to the West African Rice Development Association.
15. Rice Statistics Yearbook (Abstracts), Second Edition.
Annuaire Statistique du riz (Extraits), Deuxième Edition.
16. Etude des aspects économiques du développement de la riziculture au Bénin.

17. WARDA Research Programme - Progress and future plans (A quinquennial report, 1973-1978).
18. Office du Niger and Operation Riz Segou in Mali: A Socio-economic survey and comparative study - A research proposal.
19. The role of WARDA in the transfer of technology.
20. Rapport final du séminaire sur le renforcement des capacités rizicoles des pays membres.
21. Five years of research.
22. Final Report of the Seminar on the reinforcement of the rice growing potential of member countries.
23. Rapport de la mission conjointe PNUD/FAO/ADRAO - PROJET RAF.75/022 - Assistance à l'ADRAO.

4. Language Laboratory

Only a small minority of the WARDA's Headquarters Professional Staff can be considered as bilingual. It is essential that every staff member acquires a reasonable knowledge of a second language for effective work and relationship.

5. Public Relations

Although WARDA has kept its public relations activities at a low level for lack of staff and facilities, they are necessary to create and promote the Association's image, and to generate the political and economic support for its programmes. A number of actions have already been undertaken: field days, exhibitions, TV programmes, publication of general information brochures, which will be expanded and diversified in the future. But these are clearly insufficient, and more should be done to keep informed, at different levels, a varied audience consisting of member Governments, cooperating governments, agencies and research institutions, and the general public. This of course, requires staff, which is not available, and funds.